

### III. RECOVERY

#### A. OBJECTIVES

The overall objectives of this recovery plan are to delist California jewelflower, palmate-bracted bird's-beak, Kern mallow, Hoover's woolly-star, San Joaquin woolly-threads, Bakersfield cactus, giant kangaroo rat, Fresno kangaroo rat, Tipton kangaroo rat, blunt-nosed leopard lizard, and San Joaquin kit fox; and achieve the long-term conservation of lesser saltscall, Bakersfield smallscale, Lost Hills saltbush, Vasek's clarkia, Temblor buckwheat, Tejon poppy, diamond-petaled California poppy, Munz's tidy-tips, Comanche Point layia, Jared's peppergrass, Merced monardella, Merced phacelia, oil neststraw, Ciervo aegialian scarab beetle, San Joaquin dune beetle, Doyen's dune weevil, San Joaquin antelope squirrel, short-nosed kangaroo rat, riparian woodrat, Tulare grasshopper mouse, Buena Vista Lake shrew, riparian brush rabbit, and San Joaquin LeConte's thrasher and other members of biotic communities occupied by the listed species in the San Joaquin Valley planning area.

Interim goals are to stabilize and protect populations and to conduct research necessary to refine reclassification and recovery criteria and subsequently reclassify California jewelflower, palmate-bracted bird's-beak, Kern mallow, San Joaquin woolly-threads, Bakersfield cactus, giant kangaroo rat, Fresno kangaroo rat, Tipton kangaroo rat, blunt-nosed leopard lizard, and San Joaquin kit fox from endangered to threatened. Reclassification will be appropriate when each taxon is no longer in danger of extinction throughout a significant portion of its range.

#### 1. Ecosystem-Level Strategy

To meet the objective of delisting 11 species and ensuring long-term conservation of 23 other species, this recovery plan uses an ecosystem-level strategy. This strategy establishes a network of reserves and conservation areas that represents all natural communities in San Joaquin upland ecosystems. Of necessity, the ecosystem-level strategy is shaped by the realities of existing communities, available information on biology, distribution, and population statuses, and the current and anticipated processes that will affect both natural and human-altered landscapes. The strategy has 10 major elements:

- a. The primary focus of recovery processes is on publicly-owned lands whenever possible. Where conservation of a species requires preservation of private lands, it will be necessary to seek cooperation from private individuals and entities to sell lands or easements, or, to enter into cooperative (voluntary) programs to maintain and enhance habitat values for certain species while traditional uses of the land continue unhampered. Cooperative programs are emphasized over land acquisition or easements.
- b. Wherever possible, conservation efforts are focused on fewer, larger blocks of land rather than smaller, more numerous parcels. Several advantages to this approach are enumerated by the San Joaquin Valley Biological Technical Committee (in litt. 1993), the most important of which are that larger natural areas provide greater species and physical diversities and larger, less vulnerable species populations, minimize edge between natural and developed land thereby reducing pest and other problems at this boundary, and reduce management costs.
- c. Wherever possible and needed, blocks of conservation lands should be connected by natural land or land with compatible uses that allow for movement of species between blocks.
- d. Greater emphasis is placed on two groups of species as defined below:
  1. ***Umbrella Species.*** The San Joaquin kit fox occurs in nearly all the natural communities used by other species featured in this plan, but these others are much more restricted in their choice of habitats. The broad distribution and requirement for relatively large areas of habitat mean conservation of the kit fox will provide an umbrella of protection for many other species that require less habitat. Therefore, the San Joaquin kit fox is an umbrella species for purposes of this recovery plan. Many of its habitat management and research needs are given higher priority in recovery actions at the

regional level (i.e., the ecosystem level) than those of other species because it is one of the species that will be hardest to recover; fulfilling its habitat management and research needs also meets those of many other species.

2. **Keystone Species.** The giant kangaroo rat and, to a lesser extent, the subspecies of the San Joaquin kangaroo rat are keystone species in their communities (Goldingay et. al. 1997). In most places where they occur, the *precincts* (area over and immediately around the burrow system) of giant kangaroo rats dominate the landscape. The activities of these animals promote more nitrogen-rich and abundant growth of plants on the precincts (Williams et al. 1993a). Their burrowing modifies the surface topography of the landscape and changes the mineral composition of the soil. Their burrows provide refuges and living places for many small animals, including blunt-nosed leopard lizards and San Joaquin antelope squirrels (Williams and Kilburn 1991). Their seed caching behaviors disperse and plant seeds and alter the floral composition of the community (Schiffman 1994). Their precincts provide a favored microhabitat for the growth of California jewelflowers and San Joaquin woolly-threads (Cypher in litt. 1994a). Giant kangaroo rats are the most abundant mammal in their community, and are the favored prey of San Joaquin kit foxes and many other predators (Williams 1992). The San Joaquin kangaroo rat has a similar but less dramatic role in its communities (Williams in litt. 1985). The giant kangaroo rat and San Joaquin kangaroo rat, therefore, are considered to be keystone species in this recovery plan. Protection of these keystone species is a high priority because they provide important or essential components of the *biological niche* (meaning all the physical and biological factors required for a particular species to live, and its way of living) of some other listed and candidate species.
  - e. Wherever and whenever possible, management of habitat for featured species should be achieved in harmony with traditional land uses and processes such as seasonal livestock grazing, low impact petroleum and mineral exploration and extraction, and hunting and wildland recreation.
  - f. For species vulnerable to traditional land uses, and for those with highly restricted geographic ranges and specialized habitat requirements, there is no recourse but to appropriately manage their existing habitat in smaller, specialty reserves of natural land, both within larger conservation areas and as small reserves surrounded by developed land.
  - g. Existing natural lands occupied by the featured species are targeted for conservation in preference to unoccupied natural land and retired farmland. This goal greatly reduces or eliminates the need for expensive and untested restoration work to make the land suitable for habitation by these species.
  - h. Species for which sufficient, occupied natural land does not exist, but is needed to increase population size or promote movement between populations, can be recovered by carefully coordinating agricultural land retirement programs with endangered species recovery. Directing the location and size of blocks of retired farmland can contribute greatly to the potential success of recovery of some species while minimizing costs and conflicts with other land uses.
  - i. For species such as the San Joaquin kit fox that can live in or move through the farmland matrix, enhancement of those features of the landscape that engender successful living and movements from population centers on the larger islands of natural lands on the Valley floor to the Valley's perimeter will greatly enhance the chances of recovery. This linkage can be accomplished in part through a *safe harbor program* that promotes and enhances populations of some species on and movements through farmland while permitting incidental take of listed species by farming activities (Hawkins 1995, Keystone Center 1995). A safe harbor program was recently proposed for the San Joaquin

Valley by the American Farmland Trust (AFT) (Scott-Graham in litt. 1994). The Endangered Species Recovery Program has collaborated with the AFT in proposing a focused safe harbor program featuring the San Joaquin kit fox. This focused program is a critical element of the recovery strategy.

- j. This recovery strategy is complementary wherever possible with ongoing Habitat Conservation Plans and provides guidance to local governments in the development of new Habitat Conservation Plans.

This ecosystem-level strategy is in large part based on the biological imperatives for recovery of the San Joaquin kit fox, the umbrella species for this recovery effort. Section II.L.6 expands on this species' recovery goal: establishment of a viable kit fox metapopulation through protection and management of a system of core and satellite populations on public and private lands throughout its range. Recovery of the kit fox will not automatically lead to recovery of all other sensitive species in San Joaquin Valley ecosystems. However, it provides a blueprint for ecosystem recovery that will be complemented by specific recovery actions on natural communities for species with special needs that have little relationship to kit fox recovery needs. Implementation of this strategy retains the advantages of ecosystem-level conservation: involving all segments of society in recovery actions; preserving all or most species simultaneously; saving effort and money; and increasing the chances that recovery efforts will succeed.

## B. RECOVERY CRITERIA

Recovery criteria for listed plant and animal species are summarized in Table 4. Site-specific protection requirements to meet these delisting criteria are summarized in Table 5. Measures to ensure conservation of candidate species and species of concern are listed in Table 6. For several of the species featured in this plan, one or more categories of information needed to set firm recovery or conservation criteria are not available, necessitating interim criteria of stabilizing existing populations and conducting research necessary to determine reclassification or delisting criteria.

In Table 4, progress of species in achieving population goals depends on monitoring showing "stability" or "increasing numbers" during a precipitation

cycle, which is a period when annual rainfall includes average to 35 percent above-average through greater than 35 percent below-average and back to average or greater. The direction of change (average to above or below average) is unimportant in this criterion. Existing data for some arid-land species show that both drought and periods of above-average precipitation cause severe population declines if extended for more than 1 year. Because the populations of most or all species included here fluctuate dramatically, *stability* is a relative term meaning the statistically same population size during the average phase of a precipitation cycle. *Increasing population size* means that the population has increased over the previous or baseline year, measured during the specified portion of a precipitation cycle. Range wide population monitoring programs will have to be established for all species to measure progress in meeting recovery criteria. For species with existing data on population statuses spanning 1 or more years, these data can be included in measuring population recovery goals if it is deemed scientifically valid and representative. Thus, some species can be downlisted or delisted quickly once other criteria, such as habitat protection, are met.

**Listed Plant Species.**—Delisting criteria for the plant species currently listed as endangered include requirements for protecting additional habitat, assurances that protected sites are being managed appropriately, and monitoring to show stable or increasing populations. Attainment of downlisting or delisting criteria does not automatically qualify a species for reclassification. A status review must be conducted after the criteria have been met to determine whether or not reclassification is appropriate.

**Plant Species of Concern.**—Existing information for the species of concern is insufficient at this time to determine whether or not they qualify for listing as endangered or threatened. Thus, the actions necessary for these species include surveys in suitable habitat and evaluation of threats. In certain cases, management actions are recommended to counter known threats and stabilize populations. Additional information on species of concern also can be collected during field surveys. The strategy for plant species of concern is based on the assumption that if populations remain throughout the historical range, are secure from threats, and are not declining, formal listing is not necessary.

**Listed Animal Species.**—For listed animal species,

**TABLE 4. Generalized Recovery Criteria for Federally-Listed Plants and Animals.**

*Though not explicitly stated, delisting criteria include meeting all of the downlisting criteria. Range-wide population monitoring should be provided for in all management plans. See individual species accounts for discussion of recovery strategy and the introduction to this section for a discussion of the bases of the criteria.*

Species	Recovery Step	Secure and protect specified recovery areas from incompatible uses	Management Plan approved and implemented for recovery areas that include survival of the species as an objective	Population monitoring in specified recovery areas shows:
<b>California jewelflower</b>	<b><i>Downlist to threatened</i></b>	95 percent of occupied habitat on public lands; 75 percent of population and occupied habitat in Santa Barbara Canyon	For all protected areas identified as essential to continued survival	Stable or increasing populations through precipitation cycle
	<b><i>Delist</i></b>	90 percent of population and occupied habitat in Santa Barbara Canyon; 1 population each on the San Joaquin Valley floor and eastern Valley foothills	For all protected areas identified as a essential to continued survival	No decline after downlisting, if declining, determine cause and reverse trend
<b>palmate-bracted bird's beak</b>	<b><i>Downlist to threatened</i></b>	95 percent of occupied habitat on public land; 75 percent or more of population and occupied area and upland nesting habitat for pollinators within 300 meters (984 feet) of the population margins at Springtown Alkali Sink; 2 or more populations in the San Joaquin Valley	For all protected areas identified as essential to continued survival	Stable or increasing populations through precipitation cycle
	<b><i>Delist</i></b>	8 or more distinct populations, including 2 or more in the San Joaquin Valley; 90 percent or more of the Springtown Alkali Sink population and habitat	For all protected areas identified as essential to continued survival	No decline after downlisting, if declining, determine cause and reverse trend
<b>Kern mallow</b>	<b><i>Downlist to threatened</i></b>	95 percent of occupied habitat on public lands; 75 percent of population and 75 percent of occupied habitat in Lokern	For Lokern Area	Stable or increasing populations through precipitation cycle
	<b><i>Delist</i></b>	90 percent or more each of population and occupied habitat in Lokern; 2 or more distinct populations outside the Lokern Natural Area (if Kern mallow positively identified elsewhere)	For all protected areas identified as essential to continued survival	No decline after downlisting, if declining, determine cause and reverse trend
<b>Hoover's woolly-star</b>	<b><i>Delist</i></b>	75 percent of occupied habitat on public lands in each of the 4 metapopulations; 260 hectares (640 acres) or more of occupied habitat on San Joaquin Valley floor	For all protected areas identified as essential to continued survival	Stable or increasing in 4 metapopulations and San Joaquin Valley floor population through 1 precipitation cycle; if declining, determine cause and reverse trend

**TABLE 4.** (continued). **Generalized Recovery Criteria for Federally-Listed Plants and Animals.** Though not explicitly stated, delisting criteria include meeting all of the downlisting criteria. Range-wide population monitoring should be provided for in all management plans. See individual species accounts for discussion of recovery strategy and the introduction to this section for a discussion of the bases of the criteria.

Species	Recovery Step	Secure and protect specified recovery areas from incompatible uses	Management Plan approved and implemented for recovery areas that include survival of the species as an objective	Population monitoring in specified recovery areas shows:
<b>San Joaquin woolly-threads</b>	<b><i>Downlist to threatened</i></b>	95 percent of occupied habitat on public land	For all protected areas identified as essential to continued survival	Stable or increasing in all protected areas through 1 precipitation cycle
	<b><i>Delist</i></b>	260 hectares (640 acres) or more of occupied habitat in the Lost Hills; 1 or more other sites on San Joaquin Valley floor of 260 hectares (640 acres) or more	For all protected areas identified as essential to continued survival	No decline after downlisting, if declining, determine cause and reverse trend
<b>Bakersfield cactus</b>	<b><i>Downlist to threatened</i></b>	95 percent of the occupied habitat on public land; 75 percent of Bakersfield cactus clumps and 75 percent of the occupied habitat in the Caliente-Bena Hills, Comanche Point, Kern Bluff, Sand Ridge, and Wheeler Ridge areas	For all protected areas identified as essential to continued survival	Stable or increasing populations at all protected sites for a 5-year period
	<b><i>Delist</i></b>	90 percent of existing clumps and occupied habitat in the above-specified areas; and the Fuller Acres, Cottonwood Creek, Granite Station, and Kern Canyon populations; 100 or more clumps each in other populations north and south of the Kern River	For all protected areas identified as essential to continued survival	All protected populations show evidence of reproduction
<b>giant kangaroo rat</b>	<b><i>Downlist to threatened</i></b>	Carrizo Plain Natural Area; western Kern County areas, and all occupied lands in Ciervo-Panoche Natural Area, as specified in recovery strategy	All protected areas identified as essential to continued survival including the Carrizo Plain Natural Area	During 5-year period no greater than 20 percent change in population size during years without drought or greater than 35 percent above average precipitation
	<b><i>Delist</i></b>	100 percent of occupied habitat on public lands in the Cuyama Valley, San Juan Creek Valley and Kettleman Hills	Public lands in Cuyama Valley and Kettleman Hills	Stable or increasing populations for the Carrizo, Panoche, and western Kern Co. metapopulations through 1 precipitation cycle

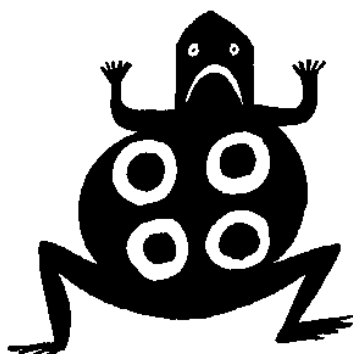
**TABLE 4.** (continued). **Generalized Recovery Criteria for Federally-Listed Plants and Animals.** Though not explicitly stated, delisting criteria include meeting all of the downlisting criteria. Range-wide population monitoring should be provided for in all management plans. See individual species accounts for discussion of recovery strategy and the introduction to this section for a discussion of the bases of the criteria.

Species	Recovery Step	Secure and protect specified recovery areas from incompatible uses	Management Plan approved and implemented for recovery areas that include survival of the species as an objective	Population monitoring in specified recovery areas shows:
<b>Fresno kangaroo rat</b>	<b><i>Downlist to threatened</i></b>	100 percent of occupied habitat on public or conservation lands at 3 or more distinct sites, each no less than about 384 hectares (950 acres) of usable habitat	For all inhabited areas identified as essential to continued survival	Population densities in 3 or more populations do not fall below 2 kangaroo rats per hectare (1 per acre) and have a mean density of 10 or more per hectare (4 or more/acre) during 1 precipitation cycle
	<b><i>Delist</i></b>	1 additional site with about 1,012 hectares (2,500 acres) or more of occupied habitat, with a total of no less than 2,164 hectares (5,350 acres) of occupied habitat	For all protected areas identified as essential to continued survival	Protected sites have a mean density of 10 kangaroo rats per hectare (4 per acre) during a complete precipitation cycle
<b>Tipton kangaroo rat</b>	<b><i>Downlist to threatened</i></b>	3 or more distinct areas with 2,000 hectares (4,940 acres) or more of continuous, occupied habitat, with 30 percent each or more of the minimum acreage in public or conservation ownership	For all protected areas identified as essential to continued survival	Stable or increasing populations through 1 precipitation cycle
	<b><i>Delist</i></b>	A total of 9,000 (22,230 acres) hectares or more of occupied habitat in public or conservation ownership		Protected sites have a mean density of 10 kangaroo rats per hectare 4 per acre) during a complete precipitation cycle
<b>blunt-nosed leopard lizard</b>	<b><i>Downlist to threatened</i></b>	5 or more areas, each of about 2,428 hectares (5,997 acres) or more of continuous, occupied habitat, including 1 each on: Valley floor in Merced or Madera Counties; Valley floor in Tulare or Kern Counties; foothills of the Ciervo-Panoche Natural Area, foothills of western Kern County, and the Carrizo Plain Natural Area	For all protected areas identified as essential to continued survival	Each protected area has a mean density of 2 or more lizards per hectare (1 per acre) through one precipitation cycle
	<b><i>Delist</i></b>	3 additional areas with about 2,428 hectares (5,997 acres) or more of continuous, occupied habitat, 1 on the Valley floor, 1 along the western Valley edge in Kings or Fresno Counties, and 1 in Upper Cuyama Valley	For all protected areas identified as essential to continued survival	Each protected area has a mean density of 2 or more lizards per hectare through 1 precipitation cycle

**TABLE 4.** (continued). **Generalized Recovery Criteria for Federally-Listed Plants and Animals.**

Though not explicitly stated, delisting criteria include meeting all of the downlisting criteria. Range-wide population monitoring should be provided for in all management plans. See individual species accounts for discussion of recovery strategy and the introduction to this section for a discussion of the bases of the criteria.

Species	Recovery Step	Secure and protect specified recovery areas from incompatible uses	Management Plan approved and implemented for recovery areas that include survival of the species as an objective	Population monitoring in specified recovery areas shows:
San Joaquin kit fox	<i>Downlist to threatened</i>	The 3 core populations, Carrizo Natural Area, western Kern County, and Ciervo-Panoche Area; 3 satellite populations	For all protected areas identified as essential to continued survival	Stable or increasing populations in the 3 core areas through 1 precipitation cycle; population interchange between 1 or more core populations and the 3 satellite populations
	<i>Delist</i>	Several additional satellite populations (number dependent on results of research) encompassing as much as possible of the environmental and geographic variation of the historic geographic range	For all protected areas identified as essential to continued survival	Stable or increasing populations in the 3 core areas and 3 or more of the satellite areas during 1 precipitation cycle



**Table 5. Site-Specific Protection Requirements to Meet Delisting Criteria for the 6 Federally-Listed Plant and 5 Federally-Listed Animal Species.** Protection levels apply to any lands specified in the ownership column.

Species	Site Name	County	Ownership	Protection Level
<b>California jewelflower</b>	Carrizo Plain	San Luis Obispo	USBLM/CDFG/The Nature Conservancy	95 percent of occupied habitat
	Kreyenhagen Hills San Joaquin Valley 1. valley floor 2. eastern foothills	Fresno any	USBLM any	95 percent of occupied habitat 260 hectares (640 acres) 260 hectares (640 acres)
	Santa Barbara Canyon	Santa Barbara	USBLM/private	90 percent of plants and occupied habitat
<b>Palmate-bracted bird's-beak</b>	Colusa National Wildlife Refuge	Colusa	USFWS	95 percent of occupied habitat
	Delevan National Wildlife Refuge	Colusa	USFWS	95 percent of occupied habitat
	Sacramento National Wildlife Refuge	Colusa/Glenn	USFWS	95 percent of occupied habitat
	San Joaquin Valley 1. Alkali Sink Ecological Reserve-Mendota Waterfowl Management Area 2. other (including western Madera County)	Fresno any	CDFG any	95 percent of occupied habitat 260 hectares (640 acres)
	Springtown Alkali Sink	Alameda	City of Livermore/ Federal Communications Commission/private	90 percent of plants and occupied habitat
<b>Kern mallow</b>	Central Valley	any	any	2 about 260 hectares (640 acres)
	Lokern other (if Kern mallow positively identified elsewhere)	Kern Kern	USBLM/The Nature Conservancy/private any	90 percent of plants and occupied habitat 2 about 260 hectares (640 acres)



**Table 5** (continued). *Site-Specific Protection Requirements to Meet Delisting Criteria for the 6 Federally-Listed Plant and 5 Federally-Listed Animal Species. Protection levels apply to any lands specified in the ownership column.*

Species	Site Name	County	Ownership	Protection Level
<b>Hoover's woolly-star</b>	Antelope Plain-Lost Hills-Semitropic	Kern	USBLM/The Nature Conservancy	75 percent of occupied habitat
	Carrizo Plain-Elkhorn Plain-Temblor Range-Caliente Mountains-Cuyama Valley-Sierra Madre Mountains	San Luis Obispo/Santa Barbara	USBLM/CDFG/The Nature Conservancy/ U.S. Forest Service	75 percent of occupied habitat
	Kettleman Hills	Fresno/Kings	USBLM	75 percent of occupied habitat
	Lokern-Elk Hills-Buena Vista Hills-Coles Levee-Taft-Maricopa	Kern	USBLM/CDFG/CLEP/ U.S. Department of Energy/The Nature Conservancy	75 percent of occupied habitat
<b>San Joaquin woolly-threads</b>	San Joaquin Valley floor (may be within above areas including Alkali Sink Ecological Reserve)	any	any	260 hectares (640 acres)
	Carrizo Plain-Elkhorn Plain	San Luis Obispo	USBLM/CDFG/The Nature Conservancy	95 percent of occupied habitat
	Jacalitos Hills	Fresno	USBLM	95 percent of occupied habitat
	Kettleman Hills Lost Hills Panoche Hills San Joaquin Valley floor (may be within Lost Hills)	Fresno/Kings Kern Fresno/San Benito any	USBLM USBLM private USBLM any	95 percent of occupied habitat 95 percent of occupied habitat 260 hectares (640 acres) 95 percent of occupied habitat 260 hectares (640 acres)
<b>Bakersfield cactus</b>	Caliente-Bena Hills	Kern	private	90 percent of clumps and occupied habitat
	Comanche Point	Kern	private	90 percent of clumps and occupied habitat
	Cottonwood Creek	Kern	private	90 percent of clumps and occupied habitat
	Fuller Acres	Kern	private	90 percent of clumps and occupied habitat
	Granite Station	Kern	private	90 percent of clumps and occupied habitat
	Kern Bluffs	Kern	private/Kern Co.	90 percent of clumps and occupied habitat
	Kern Canyon	Kern	private	90 percent of clumps and occupied habitat
	Metropolitan Bakersfield south of Kern River	Kern	private	90 percent of clumps and occupied habitat 100 clumps

**Table 5** (continued). *Site-Specific Protection Requirements to Meet Delisting Criteria for the 6 Federally-Listed Plant and 5 Federally-Listed Animal Species. Protection levels apply to any lands specified in the ownership column.*

Species	Site Name	County	Ownership	Protection Level
<b>Bakersfield cactus</b> (continued)	north of Kern River Sand Ridge	Kern	private	100 clumps
	Wheeler Ridge	Kern	The Nature Conservancy/private private/Department of Water Resources	90 percent of clumps and occupied habitat 90 percent of clumps and occupied habitat
	Ciervo-Panoche Natural Area Western Kern County 1. Lokern Area 2. Naval Petroleum Reserve-1 3. Naval Petroleum Reserve-2 4. Other areas with natural land	Fresno, San Benito Kern	USBLM/CDFG/Private USBLM/CDFG/ California Department of Water Resources/ U.S. Department of Energy/The Nature Conservancy/private	entire metapopulation 90 percent of existing habitat 90 percent of existing habitat (all in Buena Vista/McKittrick Valleys) 80 percent of existing habitat (all in Buena Vista Valley) 80 percent of existing habitat entire metapopulation
<b>Fresno kangaroo rat</b>	Carrizo Plain Natural Area San Juan Creek Valley Upper Cuyama Valley Kettleman Hills	San Luis Obispo	USBLM/CDFG/The Nature Conservancy	
	Western Madera County	Madera	private	greater than or equal to 1,012 hectares (2,500 acres) of occupied habitat
	Kerman & Alkali Sink Ecological Reserves Lemoore Naval Air Station	Fresno Kings, Fresno	CDFG Department of Defense (U.S. Navy)	greater than or equal to 384 hectares (950 acres) each of occupied habitat greater than or equal to 384 hectares (950 acres) of occupied habitat

**Table 5** (continued). *Site-Specific Protection Requirements to Meet Delisting Criteria for the 6 Federally-Listed Plant and 5 Federally-Listed Animal Species. Protection levels apply to any lands specified in the ownership column.*

Species	Site Name	County	Ownership	Protection Level
<b>Tipton kangaroo rat</b>	Pixley National Wildlife Refuge- Allensworth Natural Area	Tulare, Kern	USFWS/CDFG/private	greater than or equal to 2,000 hectares (4,942 acres) of continuous, occupied habitat
	Semitropic Ridge Natural Area	Kern	USFWS/CDFG/The Nature Conservancy/ private	greater than or equal to 2,000 hectares (4,942 acres) of continuous, occupied habitat
	Kern Fan <sup>1</sup>	Kern	California Department of Water Resources/	greater than or equal to 2,000 hectares (4,942 acres) of continuous, occupied habitat
<b>Blunt-nosed leopard lizard</b>	northern Valley floor	Merced or Madera	private	greater than or equal to 2,428 hectares (6,000 acres) continuous, occupied habitat
	western edge of Valley	Fresno, San Benito	USBLM/private	greater than or equal to 2,428 hectares (6,000 acres) continuous, occupied habitat
	southern Valley floor	Tulare	USFWS/CDFG/private	greater than or equal to 2,428 hectares continuous, occupied habitat
	west-central edge of Valley	Kings, Fresno	USBLM/private	greater than or equal to 2,428 hectares (6,000 acres) continuous, occupied habitat
	southern Valley floor	Kern	USFWS/CDFG/The Nature Conservancy/ California Department of Water Resources/ private	greater than or equal to 2,428 hectares (6,000 acres) continuous, occupied habitat
	western Kern County	Kern	USBLM/CDFG/ California Department of Water Resources/ Department of Energy/ The Nature Conser- vancy/private	greater than or equal to 2,428 hectares (6,000 acres) continuous, occupied habitat
	Carrizo Plain Natural Area Upper Cuyama Valley	San Luis Obispo	USBLM/CDFG/The Nature Conservancy	entire metapopulation

**Table 5** (continued). *Site-Specific Protection Requirements to Meet Delisting Criteria for the 6 Federally-Listed Plant and 5 Federally-Listed Animal Species.*  
Protection levels apply to any lands specified in the ownership column.

Species	Site Name	County	Ownership	Protection Level	Priority Level
San Joaquin kit fox <sup>2</sup>	Ciervo-Panoche Natural Area western Kern County	Fresno, San Benito Kern	USBLM/CDFG/private USBLM/CDFG/ California Department of Water Resources/U.S. Department of Energy/ The Nature Conser- vancy/private		1 1
	Carrizo Plain Natural Area	San Luis Obispo	USBLM/CDFG/The Nature Conservancy/ private		1
	greater than or equal to 9 satellite populations:		various public and private		2 <sup>3</sup>
	northern range and Valley edges	Alameda, Contra Costa, San Joaquin, Stanislaus			
	northern Valley floor	Merced, Madera			
	central Valley floor	Fresno			
	west-central Valley edge	Fresno, Kings			
	southeast Valley floor	Tulare, Kern			
	Kettleman Hills	Fresno, Kings, Kern			
	southwestern Valley floor	Kern			
	Salinas-Pajaro Rivers watershed	Monterey, Santa Benito, San Luis Obispo			
	upper Cuyama Valley	Santa Barbara, San Luis Obispo			

<sup>1</sup> the state signed an Memorandum of Understanding to turn the 8,100 hectares (20,000 acres) of state land over to Kern County Water Agency.

<sup>2</sup> protection level: extinction probability of 5 percent for 300 years for entire population of the San Joaquin kit fox.

**TABLE 6. Generalized Criteria for Long-Term Conservation of California-Listed and Federal Candidate Species and Species of Concern.** Range-wide population monitoring should be provided for in all management plans. See individual species accounts for discussion of conservation strategy and the introduction to this section for a discussion of the bases of the criteria.

Species	Secure and protect specified recovery areas from incompatible uses	Management Plan approved and implemented for recovery areas that include survival of the species as an objective	Population monitoring in specified recovery areas shows:
<b>Lesser saltscare</b>	95 percent of occupied habitat on public lands; 5 or more populations, including 1 or more each in Butte and Kern Counties, and 1 in Fresno, Madera, or Merced County	For all protected areas	1,000 or more individuals in years favorable for growth; all protected populations are stable or increasing through 1 precipitation cycle
<b>Bakersfield smallscale</b>	5 or more disjunct populations	For all protected areas	1,000 or more individuals in years favorable for growth; all protected populations are stable or increasing through 1 precipitation cycle
<b>Lost Hills saltbush</b>	95 percent of occupied habitat on public lands; 5 or more populations, including at least 1 each in Fresno, Kern, and San Luis Obispo Counties	For all protected areas	1,000 or more individuals in years favorable for growth; all protected populations are stable or increasing through 1 precipitation cycle
<b>Vasek's clarkia</b>	5 distinct populations occurring in at least 3 separate canyons	For all protected areas	1,000 or more individuals in years favorable for growth; all protected populations are stable or increasing through 1 precipitation cycle
<b>Temblor buckwheat</b>	95 percent of occupied habitat on public lands; 5 or more populations, including 1 each in Kern, Monterey, and San Luis Obispo Counties	For all protected populations	1,000 or more individuals in years favorable for growth; all protected populations are stable or increasing through 1 precipitation cycle
<b>Tejon poppy</b>	95 percent of occupied habitat on public lands; 5 or more populations, including 1 each on the east, south, and west edges of the southern San Joaquin Valley	For all protected sites	1,000 or more individuals in years favorable for growth; all protected populations are stable or increasing through 1 precipitation cycle
<b>Diamond-petaled California poppy</b>	5 or more populations, including 1 each in the northern, central, and southern portions of the historical geographical range	For all protected sites	1,000 or more individuals in years favorable for growth; all protected populations are stable or increasing through 1 precipitation cycle

**Table 6.** (continued). *Generalized Criteria for Long-Term Conservation of California-Listed and Federal Candidate Species and Species of Concern.* Range-wide population monitoring should be provided for in all management plans. See individual species accounts for discussion of conservation strategy and the introduction to this section for a discussion of the bases of the criteria.

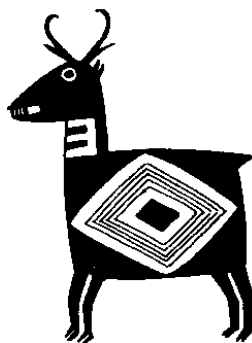
Species	Secure and protect specified recovery areas from incompatible uses	Management Plan approved and implemented for recovery areas that include survival of the species as an objective	Population monitoring in specified recovery areas shows:
<b>Comanche Point Layia</b>	5 or more populations, including 1 each in the Bena Hills, Comanche-Tejon Hills, and on the San Joaquin Valley floor	For all protected sites	1,000 or more individuals in years favorable for growth; all protected populations are stable or increasing through 1 precipitation cycle
<b>Munz's tidy-tips</b>	95 percent of occupied habitat on public lands; 5 or more populations, including 1 each in Fresno, Kern, and San Luis Obispo Counties and on the southern San Joaquin Valley floor in Kern County	For all protected sites	1,000 or more individuals in years favorable for growth; all protected populations are stable or increasing through 1 precipitation cycle
<b>Jared's peppergrass</b>	95 percent of occupied habitat on public lands; 5 or more populations of each of the 2 subspecies, including at least 1 population of the Carrizo peppergrass subspecies outside of the Carrizo Plain Natural Area	For all protected sites	1,000 or more individuals in years favorable for growth; all protected populations are stable or increasing through 1 precipitation cycle
<b>Merced monardella</b>	5 or more populations	For all protected populations	1,000 or more individuals in years favorable for growth; all protected populations are stable or increasing through 1 precipitation cycle
<b>Merced phacelia</b>	5 or more populations	For all protected populations	1,000 or more individuals in favorable years; all protected populations are stable or increasing through 1 precipitation cycle
<b>Oil neststraw</b>	95 percent of occupied habitat on public lands; 5 or more populations, including at least 1 in Kern County outside of the Elk Hills	For all protected populations	1,000 or more individuals in years favorable for growth; all protected populations are stable or increasing through 1 precipitation cycle

**Table 6.** (continued). *Generalized Criteria for Long-Term Conservation of California-Listed and Federal Candidate Species and Species of Concern.* Range-wide population monitoring should be provided for in all management plans. See individual species accounts for discussion of conservation strategy and the introduction to this section for a discussion of the bases of the criteria.

Species	Secure and protect specified recovery areas from incompatible uses	Management Plan approved and implemented for recovery areas that include survival of the species as an objective	Population monitoring in specified recovery areas shows:
<b>Dune insects</b> (Ciervo aegialian scarab beetle, Doyen's dune weevil, San Joaquin dune beetle)	5 occupied sites for each species (either as co-occupied or allopatric sites) collectively providing 150 hectares (370 acres) of inhabited sands and sand dunes, with the smallest inhabited site providing no less than 0.2 hectare of sand habitat, 3 of the sites must be fully protected from development	For all protected populations	Continuing presence at each occupied site
<b>San Joaquin antelope squirrel</b>	Carrizo Plain Natural Area, Lokern-Elk Hills, and Ciervo-Panoche Natural Area each have a minimum of about 6,070 hectares (15,000 acres) of occupied habitat; and Pixley National Wildlife Refuge-Allensworth-Semitropic Ridge Natural Areas each have of minimum of about 2,400 hectares of occupied habitat	For all populations on public and conservation lands	Stable or increasing populations through 1 precipitation cycle
<b>Short-nosed kangaroo rat</b>	Carrizo Plain Natural Area, western Kern County, and Ciervo-Panoche Natural Area, each with 2,000 hectares (4,940 acres) or more of occupied habitat; South Grasslands population	For all populations on public and conservation lands	Mean population density of 6 or more kangaroo rats/hectare during average years in precipitation cycle
<b>Riparian woodrat</b>	3 or more areas of occupied habitat each supporting 400 or more individuals, with a total population of 5,000 or more independent individuals (i.e., excluding dependent young) during average precipitation years	For all populations	Mean size of independent population no less than 400 individuals in each population in average years through 1 precipitation cycle
<b>Tulare grasshopper mouse</b>	Those areas specified as the habitat protection goals for the giant kangaroo rat and blunt-nosed leopard lizard	For all protected areas	Continuing presence on the Carrizo Plain Natural Area, Lokern-Elk Hills area, Ciervo-Panoche Natural Area, and 2 blocks on the Valley floor

**Table 6.** (continued). *Generalized Criteria for Long-Term Conservation of California-Listed and Federal Candidate Species and Species of Concern.* Range-wide population monitoring should be provided for in all management plans. See individual species accounts for discussion of conservation strategy and the introduction to this section for a discussion of the bases of the criteria.

Species	Secure and protect specified recovery areas from incompatible uses	Management Plan approved and implemented for recovery areas that include survival of the species as an objective	Population monitoring in specified recovery areas shows:
<b>Buena Vista Lake shrew</b>	3 or more disjunct occupied sites collectively with at least 12,000 hectares (4,940 acres) of occupied habitat	For all protected areas	Continuing presence at known occupied sites
<b>Riparian brush rabbit</b>	3 or more sites, each with no less than 300 adults during average years	For all protected sites	Populations sizes of 300 or more adults during average years during a precipitation cycle at each of 3 or more sites
<b>San Joaquin LeConte's thrasher</b>	Saltbush communities on public lands, including Naval Petroleum Reserves in California 1 and 2, the Lokern Natural Area, and the Carrizo Plain Natural Area; and in southwestern Kern County	For all public lands and the inhabited areas covered in the Kern County Valley Floor Habitat Conservation Plan	Stable or increasing through 1 precipitation cycle





downlisting criteria are based on the assumption that extinction is not imminent if potentially viable metapopulations are found at three or more sites representing different geographic and environmental variations. In the absence of specific information to the contrary, metapopulations are assumed to be potentially viable if there is enough continuous, occupied habitat to sustain 5,000 or more adults during average years in a period when annual rainfall cycles from average or above-average through below-average levels and back to at least average. Criteria for individual species are altered from this basic model by: the amounts of potential or actual habitat in existence; information on population dynamics (e.g., San Joaquin kangaroo rat populations fluctuate so dramatically that larger average population sizes are required); and extent of historical and current geographic distribution. To the maximum extent possible, recovery areas have been centered on or confined to lands in public or conservation ownership. Where this is not possible, existing natural lands (most with limited development potential) first have been targeted for protection.

***Candidate Animal Species and Species of Concern.***—

Existing information for the riparian brush rabbit, riparian woodrat, and Buena Vista Lake shrew is ample to support a proposal to list them under the Act. Even for these three species, where existing information is sufficient to support listing as threatened or endangered, additional information on distribution and habitat is needed to develop a complete conservation and protection strategy and establish quantitative criteria for their restoration or long-term conservation. Thus, the actions necessary for these candidate species and other species of concern include surveys in suitable habitat and, for some, evaluation of threats. Management actions to counter known threats are recommended in individual accounts. The protection strategies for most candidate animals and species of concern are based on the assumption that if populations remain throughout remnants of the historical range, are secure from threats, and are not declining, formal listing will not be necessary.

## C. RECOVERY PRIORITIES

### 1. General Ranking Categories

Actions necessary to recover a species are ranked in three categories:

**Priority 1**—an action that must be taken to prevent extinction or to prevent a species from declining irreversibly in the foreseeable future.

**Priority 2**—an action that must be taken to prevent a significant decline in species population/habitat quality or some other significant negative impact short of extinction.

**Priority 3**—all other actions necessary to meet recovery objectives.

In assigning priorities to protection of natural areas and establishment of reserves, each site was evaluated in the context of all other sites supporting the species, and the priority assigned based on the impact the development of that site alone would have on the species chances of recovery. For some of the larger sites, the entire area may not warrant the priority ranking of some subset of sites that are important to fewer species and for which a speciality reserve may be needed. Yet, in the absence of more information, the entire area was assigned the highest priority. In making management and administrative decisions, each site's importance must be considered in the context of what has and is likely to happen to all other sites, but those events cannot be forecast now.

### 2. Priority Ranking Emphasis

The ecosystem-level strategy outlined in the beginning of this chapter focuses on establishing a network of reserves and conservation areas by protecting natural communities, strategically retiring farmland and using a focused safe harbor program on private lands. In this document, *habitat protection* means ensuring appropriate uses of land to maintain and optimize species habitat values. Habitat protection does not necessarily require land acquisition or easement. There are many other ways to achieve the same end while keeping land in private ownership and fostering continuing, traditional uses that contribute to the local and national economies (Keystone Center 1995).

To ensure appropriate uses of conservation and mitigation land to maintain and enhance species habitat values requires, in most cases, active management of the land. To this date, land acquired in the Valley as mitigation for project-related habitat losses, and some parcels acquired from conservation funds, are mostly not being actively managed to maintain or enhance listed

species populations. Therefore, if San Joaquin Valley species are to be recovered, more emphasis must be placed on habitat management. There already are substantial historical habitats for a majority of species featured in this plan in public ownership, though they mostly are not sufficiently protected from catastrophes, such as flooding and excessive soil erosion, nor appropriately monitored and managed to maintain or enhance populations of featured species. Developing necessary habitat management procedures must not be neglected in favor of acquisition of additional potential habitat.

There are reasons to place increased emphasis on habitat management research:

- a. Change in ownership from private to public usually is accompanied by a change in land use. For natural lands, the principal use typically is ranching. Cessation of grazing upon purchase has frequently been followed by decline of listed species populations (though the magnitude is difficult to demonstrate on many parcels because no baseline population censuses were conducted before change in land use, and no quantitative monitoring programs were established). Grazing and other uses of land that affect the structure and composition of the community may be important habitat elements for the object species—until proven otherwise it is prudent to assume that if the species are resident, the existing land uses (at some level) do not pose an immediate threat to species survival (Williams and Germano 1993).
- b. Many parcels acquired as mitigation are too small and scattered to manage effectively. They remain idle until critical masses of land and management funds can accumulate. Meanwhile, habitat quality and species populations decline or disappear, instead of increase.
- c. When dealing with several listed species affected by a permitted project, some may have conflicting habitat management needs—managing for one species or a *guild* (a group of species with a common need for a particular habitat or other niche component) may negatively affect another species or guild (Williams and Germano 1993). More and better data are needed for developing a protection strategy that ensures that all sensitive species will benefit from selected management actions.

For some species, their statuses have deteriorated to a point where the only way they can be saved is by immediate implementation of programs that employ adaptive management (conduct essential biological research, monitor and evaluate outcomes; readjust management direction accordingly). For many of the other species, the risk is great that if information needs are not attended to soon, their statuses will be similarly jeopardized. Habitat management has high priority for half of the 34 species, though at least 11 of the other 17 also have habitat management research as a high priority, indicating that information is insufficient to develop appropriate management prescriptions today.



#### **IV. STEPDOWN NARRATIVE**

- 1 Develop and implement a regional cooperative program and participation plan.

Development of a regional cooperative program coordinating local public and private land use planning with state and Federal land use planning, recovery planning, and biodiversity conservation is needed. From this program, a participation plan should be developed and implemented to expedite and increase the chances of recovery for listed species and ensure long-term conservation of the 23 other species covered in this recovery plan.

- 1.1 Establish a regional cooperative program with participants from the public and private sector (Priority 2).

Successful development of a regional cooperative program and preparation of a participation plan requires involvement by public and private interests in the planning area. Interested parties at all levels of government and in the private sector should be identified and their willingness to participate in a cooperative program determined. Once participants are identified, the program should be initiated.

- 1.2 Develop and implement participation plans.

A participation plan should be developed to implement recovery. These plans should include outreach efforts to enhance the public's understanding of endangered species issues, economic incentives for conservation of endangered species on private lands, guidance on mitigation banking and establishment of large-scale Habitat Conservation Plans, focused safe harbor programs, and focused retirement of drainage problem lands. Separate participation plans may be developed and implemented for many of the tasks contained herein.

- 1.2.1 Develop and implement an outreach plan (Priority 2).

Outreach is an essential component of implementing this recovery plan. A plan should be developed by the regional cooperative program to provide factual information about featured species and the recovery process to interested and effected landowners. An important aspect of outreach should be landowners with reported or potential occurrences of featured species. For private lands with reported populations of featured species, landowners should be apprised of the significance of the populations on their lands and should be provided with information about available conservation mechanisms, such as conservation easements and incentive programs (See Task 1.3). For private lands with potential occurrences of featured species, permission should be sought from cooperative landowners to conduct on-site surveys. If surveys identify populations of featured species, landowners should be apprised of their significance and offered incentives to continue current land uses that support featured species habitat.

- 1.2.2 Develop and implement economic or other incentives for conservation and recovery on private lands through the cooperative program and with other groups (Priority 2).

Economic and other incentive programs (relief from taxes, tax credits, tax deductible habitat management expenses, Williamson Act, Conservation Reserve Program, Partners for Wildlife, and others) are essential to gaining the support and assistance of private landowners in conserving and recovering species featured in this recovery plan (Hudson 1993, Dwyer et al. 1995, Keystone Center 1995, Eisner et al. 1995). As part of the regional

cooperative program, or through working with other groups, such programs should be developed for the planning area. Incentive programs should play a role in protection of habitat on private property (See Task 2.1 and 2.2), and in establishing linkages on the Valley floor (Task 4.1) and elsewhere (Task 4.2).

- 1.2.3 Encourage and assist counties and owners of large amounts of natural lands in developing and implementing large-area habitat conservation plans (Priority 2).

City and county governments are the primary agencies in deciding on land uses, and thus, their involvement in any future recovery planning processes is critical. Metropolitan Bakersfield has completed a Habitat Conservation Plan, and development of Habitat Conservation Plans are in various phases for Kern, San Joaquin, and Tulare Counties. The regional cooperative program should promote similar initiatives in other Counties in the planning area. Assistance should also be provided to owners of large amounts of natural land.

- 1.2.4 Encourage and assist in the development and implementation of *mitigation banks* separately or in conjunction with large-scale Habitat Conservation Plans (Priority 2).

Mitigation banks should be promoted by the regional cooperative program as a means of overcoming many of the problems associated with mitigating for lost habitat on a piecemeal basis, separately or in conjunction with large scale Habitat Conservation Plans. Areas with the greatest potential for mitigation banks are western Kern County (one established, another in planning), the Coalinga and Ciervo-Panoche areas of western Fresno County, western Madera County, and other, lightly-developed oil and gas-producing areas. However, all large blocks of privately-owned natural land that are identified as important in this recovery plan should be considered.

- 1.2.5 Encourage and assist landowners and private interest groups in developing focused safe-harbor programs (Priority 2).

Farming interests, the CDFG, and USFWS are pursuing the development of generalized safe harbor programs in California. To assist in endangered species recovery, specific programs should be developed by the regional cooperative program or other groups. These programs should be carried out in a controlled, experimental manner for the San Joaquin kit fox, and perhaps other species on both irrigated and non-irrigated ground. Implementation of a focused safe harbor program is one of several programs needed to establish linkages for featured species between islands of natural habitat on the Valley floor (See Task 4.1). Components of a pilot safe harbor program and areas to be targeted for San Joaquin kit fox are outlined in Appendix E.

- 1.2.6 Coordinate retirement of farmlands with drainage problems with recovery needs of featured species (Priority 2).

Focused retirement of drainage problem lands is an essential component of establishing linkages between islands of natural habitat on the Valley floor for San Joaquin kit fox and other featured species (See Task 4.1). The regional cooperative program should guide the implementation of this land retirement program so that priority is given to land retirement in areas needed for endangered species recovery. Criteria for land retirement, restoration of retired farmland, and guidelines for the program are provided in Appendix D.

## 2 Protect and secure existing populations.

Natural lands known to provide habitat for listed and other sensitive species, should be protected and secured from any identified threats in perpetuity. Protection of these habitat areas requires application of adaptive management (See Task 3) to ensure species survival and recovery. Natural lands needing protection include large blocks of land that function as core areas for listed species, and smaller blocks of land, called ‘specialty’ reserves that are usually locations of populations of single species.

## 2.1 Protect and secure core habitat areas.

Table 7 lists all core areas, or large blocks of land requiring protection. Public and conservation lands listed in Table 7 should be adaptively managed to maximize their potential to support listed and sensitive species. Private lands included in Table 7 should be protected through conservation or management agreements (agreements that commit a landowner to manage property in a specified way), easements or other mechanisms, then adaptively managed. Management plans should be developed for all protected areas.

**Table 7. Large Blocks or Core Areas of Natural Lands Targeted for Protection.** See Figure 70 for the location of core habitat areas.

Recovery Task #	Locality	County	Species (target in bold) <sup>1</sup>	Landowner/Comments	Priority
2.1.1	Naval Petroleum Reserves-1 and -2 in California	Kern	<b>hws, ons, bnll, gkr, sjkf, sjwt, tp, sjas, snkr, tgm, sjlt</b>	Department of Energy/ secure long-term legal protection of natural communities and featured species; prevent disturbance of ons metapopulation	1
2.1.2	Fort Hunter Liggett/ Camp Roberts	Monterey, San Luis Obispo	<b>sjkf</b>	Department of Defense, California National Guard/ evaluate recent and ongoing base operations and land management studies on kit fox, prepare management plans beneficial to kit fox.	2
2.1.3	Kern Fan Element	Kern	<b>tkr, sjkf, bnll, bvls, hws, sjwt, bss, lss, lhsb, gkr, tgm, sjlt</b>	Kern County Water Agency/ protect, restore and enhance upland and wetland communities as part of the water banking and flood control systems, also provides a linkage between Lokern/Elk Hills and Tule Elk Reserve/Kern River Parkway; reintroduce bvls and other targeted species.	1
2.1.4	Western Kern County (includes Lokern)	Kern	<b>km, ons, lhsb, bnll, sjas, gkr, snkr, tgm, sjkf, sjlt, hws, tbw, jpg, cjf, tp, sjwt</b>	USBLM, The Nature Conservancy, private/ preserve 80-90 percent of the existing natural lands below about 500 meters (1,640 feet) between Blackwell’s Corner and Maricopa. The Lokern area is within the Kern County Valley Floor Habitat Conservation Plan and a Chevron, USA, Inc. mitigation bank; restore habitat for sjlt; prevent disturbances of ons metapopulation.	1

Recovery Task #	Locality	County	Species (target in bold) <sup>1</sup>	Landowner/Comments	Priority
2.1.5	Western Madera County	Madera	<b>pbbb, sjkf, bnll, fkr, lss, lhsb</b>	Private / continue traditional land uses (natural gas extraction and cattle grazing), possible groundwater recharge and water banking site, an essential link in the chain of habitat islands on Valley floor. Acquire title or easements for appropriate parcels from willing sellers.	1
2.1.6	North central Fresno County	Fresno	<b>pbbb, bnll, fkr, sjkf</b>	Private/ located between the San Joaquin River, immediately north of the Alkali Sink Ecological Reserve, and San Mateo Road on the west, connects Alkali Sink Ecological Reserve to the Chowchilla Canal, an essential link in the chain of habitat islands on Valley floor. Acquire title or easements for appropriate parcels from willing sellers.	2
2.1.7	Pixley National Wildlife Refuge/ Allensworth Natural Area	Tulare, Kern	<b>tkr, bnll, sjkf</b>	Private, public/ includes the best and only large remnants of Relictual Interior Dune Grassland, variations of chenopod scrub, and Haplopappus Shrubland in the Tulare Basin. Acquire title or easements for appropriate parcels from willing sellers; restore habitat for tkr.	2
2.1.8	Northwestern Merced County	Merced	<b>lhsb, lss, sjkf</b>	Public/ includes Federal wildlife refuges and waterfowl easement properties, state game areas, and state park land, provides a vital linkage between Valley floor and northwestern Valley edge, restore and enhance natural communities by practicing adaptive management, control grazing; (riparian areas are listed separately in Table 8).	3
2.1.9	Sandy Mush Road/ South Grasslands Area	Merced	<b>lhsb, bnll, sjkf, lss, pbbb, fkr</b>	Private/ a chain of habitat islands on the valley floor, that together with establishing Valley floor linkages through agricultural land, links Merced County National Wildlife Refuge's, State areas and other natural lands with the northeastern and northwestern edges of the Valley and with natural areas to the south. Acquire title or easements for appropriate parcels from willing sellers.	2

Recovery Task #	Locality	County	Species (target in bold) <sup>1</sup>	Landowner/Comments	Priority
2.1.10	Kettleman Hills	Fresno, Kings	<b>sjwt, bnll, gkr, sjas, sjkf, snkr, tgm, ddw, hws, sjdb, sjlt</b>	USBLM, private/ protect area from development through acquisition or easements from willing sellers; conduct land survey to determine ownership of site with ddw, major population center for sjwt, hws.	1
2.1.11	Kern National Wildlife Refuge/ Semitropic Ridge Natural Area	Kern	<b>hws, bnll, sjas, sjkf, tkr, mtt, lhsb, sjwt, tgm</b>	USFWS, state, private/ enhance natural communities by creation of areas of refuge above historic flood levels for tkr, provides link for sjkf to Pixley/ Allensworth area, designated as preapproved acquisition area for the Metropolitan Bakersfield Habitat Conservation Plan. Acquire title or easements for appropriate parcels from willing sellers.	3
2.1.12	Carrizo Plain Natural Area	San Luis Obispo	<b>cjf, hws, jpg, tbw, sjwt, bnll, gkr, sjas, sjkf, snkr, tgm, sjlt, lhsb, mtt</b>	USBLM, state, The Nature Conservancy, private/ restore and enhance natural communities by practicing adaptive management; reintroduce featured species to suitable habitat where appropriate.	1
2.1.13	Upper Cuyama Valley	Santa Barbara, San Luis Obispo	<b>cjf, hws, sjwt, bnll, gkr, sjas, sjkf, snkr, tgm, sjlt</b>	USBLM, private/ protect natural lands from development through acquisition or easement from willing sellers; ensure traditional rangeland uses continue while protecting vulnerable plant populations (Santa Barbara Canyon listed as a speciality reserve area in Table 8).	3
2.1.14	Ciervo-Panoche Natural Area	Fresno, San Benito	<b>jpg, hws, sjwt, lhsb, mtt, bnll, gkr, sjas, sjkf, sjlt, snkr, tgm, casb, sjdb</b>	USBLM, State, private/ protect natural lands from development through acquisition or easement from willing sellers; ensure traditional rangeland uses continue while monitoring and protecting vulnerable plant and insect populations.	1
2.1.15	Kreyenhagen Hills	Fresno	<b>cjf, sjkf, snkr</b>	USBLM, private/ only known population of cjf on public land east of the inner Coast Ranges; continue protecting cjf population and managing rangeland in an adaptive manner.	1

Recovery Task #	Locality	County	Species (target in bold) <sup>1</sup>	Landowner/Comments	Priority
2.1.16	Bitter Creek National Wildlife Refuge	Kern, Ventura	sjas, sjkf, tgm	USFWS/ restore and enhance natural communities by practicing adaptive management.	3
2.1.17	Kerman & Alkali Sink Ecological Refuges	Fresno	<b>pbbb</b> , sjkf, <b>fkf</b> , bnll, hws, lss, lhsb	CDFG/ restore and enhance natural communities by practicing adaptive management; reintroduce fkr.	1
2.1.18	Mendota Wildlife Management Area	Fresno	<b>pbbb</b> , sjkf, <b>fkf</b> , snkr, bnll	CDFG/ manage appropriately for featured species, develop specific management agreement for areas not managed for waterfowl.	3
2.1.19	Northwestern portion of kit fox range	Alameda, Contra Costa	<b>sjkf</b>	Mostly private/ maintain larger natural areas identified in CDFG's Framework for Maintaining the San Joaquin Kit Fox in the Northwestern Segment of its Range (in litt. 1996), maintain beneficial grazing practices.	2

<sup>1</sup> Species

bc – Bakersfield cactus; bnll – Blunt-nosed leopard lizard; bss – Bakersfield smallscale; bvls – Buena Vista Lake shrew; casb – Ciervo aegialian scarab beetle; cjf – California jewelflower; cpl – Comanche Point layia; ddw – Doyen's dune weevil; dpcp – Diamond-petaled California poppy; fkr – Fresno kangaroo rat; gkr – Giant kangaroo rat; hws – Hoover's woolly-star; jpg – Jared's peppergrass; km – Kern mallow; lhsb – Lost Hills saltbush; lss – Lesser saltscale; mm – Merced monardella; mp – Merced phacelia; mtt – Munz's tidy-tips; ons – Oil neststraw; pbbb – Palmate-bracted bird's-beak; tp – Tejon poppy; rbr – Riparian brush rabbit; rwr – Riparian woodrat; sjas – San Joaquin antelope squirrel; sjdb – San Joaquin dune beetle; sjkf – San Joaquin kit fox; sjkr – San Joaquin kangaroo rat; sjlt – San Joaquin LeConte's thrasher; sjwt – San Joaquin woolly-threads; snkr – Short-nosed kangaroo rat; tbw – Temblor buckwheat; tgm – Tulare grasshopper mouse; tkr – Tipton kangaroo rat; vc – Vasek's clarkia



Front side of Figure 70

Back side of Figure 70

## 2.2 Establish and protect specialty reserves.

Table 8 lists specialty reserves to be established. Figure 71 shows the general location of these specialty reserves. Several of these specialty reserves are located within linkage areas (See Task 4). Public and conservation lands listed in Table 8 should be adaptively managed to maximize their potential to support listed and sensitive species. Private lands included in Table 8 should be protected through conservation or management agreements, acquisition, easements or other mechanisms, then adaptively managed. Management plans should be developed for all protected areas.

**Table 8. Natural Lands Targeted for Protection as Specialty Reserves.** See Figure 71 for the location of each specialty reserve.

Recovery Task #	Locality (Map Symbol - Figure 71)	County	Species (target in bold) <sup>1</sup>	Landowner/Comments	Priority
2.2.1	Woodland (A)	Yolo	<b>pbbb</b>	City of Woodland/ develop and implement habitat restoration, enhancement and management plan.	3
2.2.2	Springtown Alkali Sink (B)	Alameda	<b>pbbb</b>	City of Livermore, Federal Communications Commission, private/ enhance habitat, develop and implement a plan to restore natural hydrology, establish cooperative management program; greatest genetic diversity for pbbb.	1
2.2.3	Lower Stanislaus River (C)	San Joaquin, Stanislaus	<b>rbr, rwr</b>	COE/ review and enforce wildlife habitat easements downstream from the City of Ripon, restore riparian habitat, provide additional flood and fire protection; prepare emergency preplan for habitat protection at Caswell State Park; reintroduce rbr, rwr.	1
2.2.4	San Joaquin River National Wildlife Refuge (D)	Stanislaus	<b>rbr, rwr</b>	USFWS-Private/ restore riparian habitat, provide additional flood and fire protection; reintroduce rbr, rwr.	1
2.2.5	San Joaquin River Riparian Communities (E)	Merced	<b>rbr, rwr, sjkf</b>	CDFG, California Department of Parks and Recreation, USFWS/ restore riparian habitat, manage grazing, provide additional flood and fire protection, upland habitat may provide linkage; reintroduce rbr, rwr.	1
2.2.6	Lemoore Naval Air Station (F)	Kings	<b>fkr, bnll, sjkf</b>	Navy/ enlarge and restore habitat area by retiring adjacent farmland on the base.	1

<b>Recovery Task #</b>	<b>Locality (Map Symbol - Figure 71)</b>	<b>County</b>	<b>Species (target in bold)<sup>1</sup></b>	<b>Landowner/Comments</b>	<b>Priority</b>
2.2.7	North of Tulare Lake Bed ( <b>G</b> )	Kings	<b>flr</b> , bnll, sjkf	Private/ preserve as grazing land; possible mitigation bank sites.	1
2.2.8	Granite Station ( <b>H</b> )	Kern	<b>bc</b>	Private/ isolated from metropolitan Bakersfield population, potential contribution to taxonomic information, maintain current land uses; translocate bc.	2
2.2.9	Devil's Den Area ( <b>I</b> )	Kern	<b>hws</b> , <b>jpg</b> , cjf, tbw, bnll, sjkf, snkr, sjas, sjlt, tgm	Private, USBLM/ maintain compatible land uses	2
2.2.10	Lost Hills-Buena Vista Slough ( <b>J</b> )	Kern	<b>sjwt</b> , <b>lhsb</b> , <b>mtt</b> , <b>hws</b> , <b>sjkf</b> , snkr, bnll, tkr, sjas	Private/ also provides an essential link between natural lands along the western edge of the Valley and natural lands in the Semitropic and Pixley-Allensworth areas; one of largest metapopulations of sjwt.	2
2.2.11	Jerry Slough to Highway 58 ( <b>K</b> )	Kern	<b>lss</b> , <b>hws</b>	Private/ southeast of Goose Lake bed; southernmost population of lss, maintain current land uses.	2
2.2.12	Greater Bakersfield, North of the Kern River ( <b>L</b> )	Kern	<b>bc</b> , bnll, sjkf	Private/ maintain existing land uses of oil production and grazing, avoid or fence plant populations; translocate bc.	3
2.2.13	Fairfax Road-Highway 178	Kern	<b>bc</b>	Private/ type locality for var. kernii, fence fragmented populations.	3
	Highway 184 ( <b>M</b> )				
2.2.14	Kern Bluffs ( <b>N</b> )	Kern	<b>bc</b> , sjkf, bnll, snkr	Private/ fence to exclude off-road vehicles from the wash area; monitor vegetation to determine effects of changing the grazing regime; translocate bc	2
2.2.15	Fuller Acres ( <b>O</b> )	Kern	<b>bc</b>	Private/ lowest elevation remaining occurrence of bc, last remnant of once extensive population.	3

<b>Recovery Task #</b>	<b>Locality</b> (Map Symbol - Figure 71)	<b>County</b>	<b>Species (target in bold)<sup>1</sup></b>	<b>Landowner/Comments</b>	<b>Priority</b>
2.2.16	Mouth of Kern Canyon ( <b>P</b> )	Kern	<b>bc</b>	Private/ population contains considerable morphological variation, maintain current land uses; translocate bc.	2
2.2.17	Cottonwood Creek ( <b>Q</b> )	Kern	<b>bc</b>	Private/ only site in association with cottonwoods, one of few sites with typical var. <i>treleasei</i> , maintain current land uses.	2
2.2.18	Bena Hills-Caliente Hills ( <b>R</b> )	Kern	<b>vc, bc</b> , cjf, cpl, tp	Private/ delimited in north by Walker Basin, south by Highway 58, southeast by Caliente, and west by Valley floor, type locality of bc, only known location of vc, maintain current land uses.	1
2.2.19	Sand Ridge ( <b>S</b> )	Kern	<b>bc</b> , sjwt, sjkf, snkr	The Nature Conservancy, private/ one of two largest metapopulations of bc, expand reserve, protect natural lands from off-road vehicles, sand mining, and conversion.	1
2.2.20	Comanche-Tejon Hills ( <b>T</b> )	Kern	<b>cpl, tp, bc</b> , sjkf, bnll, snkr	Private/ maintain current land uses.	1
2.2.21	Kern Lake-Gator Pond ( <b>U</b> )	Kern	<b>bvls, bss</b> , cpl	Private/ only known location of bvls and bss, restore hydrology and wetland vegetation; protect and secure permanent water supply.	1
2.2.22	Mettler-Wheeler Ridge ( <b>V</b> )	Kern	<b>bc</b> , bnll, snkr, sjkf	Private, California Department of Water Resources/ one of largest metapopulations of bc.	1
2.2.23	Upper Cuyama Valley, Santa Barbara Canyon ( <b>W</b> )	Santa Barbara	<b>cjf, hws</b> , sjwt, <b>bnll</b> , gkr, sjas, sjkf, <b>snkr</b> , tgm	USBLM, private/ largest extant population of cjf.	1
2.2.24	Interstate 5/ California Highway 41 ( <b>X</b> )	Kings	<b>ddw</b>	Caltrans/ survey to establish property boundaries and protect habitat on Caltrans right-of-way.	1

Recovery Task #	Locality (Map Symbol - Figure 71)	County	Species (target in bold) <sup>1</sup>	Landowner/Comments	Priority
2.2.25	Colusa, Delevan, and Sacramento National Wildlife Refuge (Y)	Colusa, Glenn	<b>pbbb</b> , lss	USFWS/ develop and implement management plans; largest population of pbbb.	1
2.2.26	Lawrence Livermore Laboratory/ Site 300 (Z)	Alameda	dpcp	Department of Energy/ develop and implement a management plan for dpcp.	1

<sup>1</sup> Species

bc – Bakersfield cactus; bnll – Blunt-nosed leopard lizard; bss – Bakersfield smallscale; bvls – Buena Vista Lake shrew; casb – Ciervo aegialian scarab beetle; cjb – California jewelflower; cpl – Comanche Point layia; ddw – Doyen’s dune weevil; dpcp – Diamond-petaled California poppy; fkr – Fresno kangaroo rat; gkr – Giant kangaroo rat; hws – Hoover’s woolly-star; jpg – Jared’s peppergrass; km – Kern mallow; lhsb – Lost Hills saltbush; lss – Lesser saltscale; mm – Merced monardella; mp – Merced phacelia; mtt – Munz’s tidy-tips; ons – Oil neststraw; pbbb – Palmate-bracted bird’s-beak; tp – Tejon poppy; rbr – Riparian brush rabbit; rwr – Riparian woodrat; sjas – San Joaquin antelope squirrel; sjdb – San Joaquin dune beetle; sjkf – San Joaquin kit fox; sjkr – San Joaquin kangaroo rat; sjlt – San Joaquin LeConte’s thrasher; sjwt – San Joaquin woolly-threads; snkr – Short-nosed kangaroo rat; tbw – Temblor buckwheat; tgm – Tulare grasshopper mouse; tkr – Tipton kangaroo rat; vc – Vasek’s clarkia

Place setter for Figure 71

*(back side of Figure 71)*



3 Determine distributions and population statuses of featured species.

Data on distribution and population numbers of most featured species are insufficient for development of management prescriptions and to implement other conservation measures. Surveys are a high priority for 22 of the 34 species and are an important priority for 9 others in this plan. Integrated programs (e.g., surveying an area for multiple species when possible) should be developed and implemented to increase efficiency and reduce costs.

3.1 Establish a program and protocol for general and directed surveys for covered species.

A coordinated program should be developed to effectively conduct surveys for featured species. A protocol should be established for directed botanical surveys (i.e., for species whose flowering or season of growth differs from the majority of plants) and general surveys for plants and animals.

3.2 Conduct general and directed surveys as needed.

Table 9 summarizes survey and population census needs for featured species. Directed and general botanical surveys are needed on remaining natural lands throughout the planning area, but especially along the eastern and southern edges of the Valley foothills. For featured animal species, information on occurrence and status is minimal along the eastern and southern edges of the Valley, in the Merced grasslands, and in the Salinas River and Pajaro River watersheds. Obtaining reliable distributional and population data for the San Joaquin kit fox is a high priority.

**Table 9. Survey and Population Census Needs for Featured Species by Geographic Area or Community in the San Joaquin Valley Planning Area. See Figure 70 for the location of specific survey areas.**

Task Number	Area	Target Species <sup>1</sup> (additional featured species known or possible)	Comments	Priority
<b>Multispecies Plant Surveys</b>				
3.2.1	Comanche-Tejon Hills	tp, cpl (bc)	Kern Co.	1
3.2.2	Caliente-Bena Hills	cjf, vc, tp, cpl (bc)	Kern Co.	1
3.2.3	Rancheria Gulch/Adobe Canyon	cjf, vc, tp, cpl (bc)	Kern Co.	2
3.2.4	southern Valley alkali sinks	lss, bss, & lhsb	Kern Co., summer-fall	1
		cpl, mtt	Kern Co., spring	2
3.2.5	alkali sinks in San Joaquin Valley north of Kern County	pbbb, lss, lhsb	Tulare, Kings, Fresno, Madera, Merced, Stanislaus, San Joaquin, Alameda, and Contra Costa Counties [summer-fall]	1
		mtt, jpg	Tulare, Kings, Fresno, Madera, and Merced Counties [spring]	2
3.2.6	alkali sinks in Sacramento Valley	pbbb, lss	Sacramento, Solano, Yolo, Sutter, Colusa, Butte, and Glenn Counties	2

<b>Task Number</b>	<b>Area</b>	<b>Target Species <sup>1</sup></b> (additional featured species known or possible)	<b>Comments</b>	<b>Priority</b>
3.2.7	Naval Petroleum Reserves in California-1 (Elk Hills)	lhsb, tp, ons (cjf, km, hws, sjwt, tbw)	Kern Co.	1
3.2.8	west side of southern San Joaquin Valley (Maricopa to McKittrick, including Buena Vista Valley and Naval Petroleum Reserves in California-2)	cjf, km, lhsb, tp, ons (hws, sjwt, tbw)	Kern Co.	1
<b>Single Species Plant Surveys</b>				
3.2.9	Cottonwood Pass	cjf	Kern and Kings Counties	2
3.2.10	historic locations outside of Elk Hills	tbw	Kern, San Luis Obispo, and Monterey Counties	2
3.2.11	Salt Creek	tp	Kern Co.	2
3.2.12	historic locations	dpcp	San Luis Obispo, Stanislaus, Alameda, Contra Costa, and Colusa Counties	1
3.2.13	historic locations in San Luis Obispo County	mtt	San Luis Obispo Co.	2
3.2.14	historic locations	jpg	San Luis Obispo, Fresno, and San Benito Counties	2
3.2.15	suitable habitat in historic range	mm	Merced and Stanislaus Counties	1
3.2.16	historic locations	mp	Merced Co.	2
<b>Multispecies Animal Surveys</b>				
3.2.17	sand and sand dune communities, northwestern San Joaquin Valley	casb, sjdb, ddw	Contra Costa, San Joaquin, Stanislaus, Merced, Fresno, San Benito Counties	3
3.2.18	upland vertebrates, northern Valley floor	bnll, fkr, sjkf (pbbb, lss, lhsb)	central Merced, W. Madera, central Fresno Counties; summer-early fall	1
3.2.19	upland vertebrates, southern Valley floor	bnll, tkr, fkr, sjkf, sjlt, tgm (lss, bss, lhsb)	Kings, Tulare, Kern Counties; summer-early fall	3
3.2.20	upland vertebrates, central western Valley edge	bnll, gkr, snkr, sjas, sjkr, sjlt, tgm	Fresno, San Benito Counties; late-spring-early fall	3
3.2.21	upland vertebrates, Kettleman Hills	bnll, gkr, snkr, sjas, sjkr, sjlt, tgm	Fresno, Kings, Kern Counties; late spring-early fall	2

Task Number	Area	Target Species <sup>1</sup> (additional featured species known or possible)	Comments	Priority
3.2.22	upland vertebrates, southwestern Valley edge	bnll, gkr, snkr, sjas sjkr, sjlt, tgm	Kings, Kern Counties from south of Pleasant Valley to south of Maricopa; late spring-early fall	3
3.2.23	upland vertebrates, southeast and southern Valley edge	bnll, snkr, sjas, sjkr, sjlt, tgm	Kern Co. from Maricopa southward and eastward, then northward to the Kern River; late spring-early fall	3
3.2.24	upland vertebrates, Cuyama Valley	bnll, gkr, snkr, sjas sjkr, sjlt, tgm	Ventura, Santa Barbara, San Luis Obispo Counties; late spring-early fall	3
3.2.25	upland vertebrates, San Juan Creek watershed	bnll, gkr, snkr, sjas sjkr, sjlt, tgm	San Luis Obispo Co.; late spring-early fall	3
3.2.26	riparian species	rbr, rwr	San Joaquin, Stanislaus Counties	1
<b>Single Species Animal Surveys</b>				
3.2.27	northwestern portion of range and northwestern Valley edge	sjkf	Contra Costa, Alameda, San Joaquin Counties	3
3.2.28	northeastern Valley edge	sjkf	Stanislaus, Merced, Madera Counties	3
3.2.29	Ciervo-Panoche Natural Area	sjlt	Fresno, San Benito Counties	3
3.2.30	southern Valley wetlands	bvls (lss, bss, lhsb)	Kern Co.	1
3.2.31	southeastern Valley edge	sjkf	Tulare, Kern Counties, north of Kern River	3
3.2.32	Salinas River and Pajaro River watersheds	sjkf	San Luis Obispo, Monterey, San Benito Counties	2

<sup>1</sup> Species

bc – Bakersfield cactus; bnll – Blunt-nosed leopard lizard; bss – Bakersfield smallscale; bvls – Buena Vista Lake shrew; casb – Ciervo aegialian scarab beetle; cjl – California jewelflower; cpl – Comanche Point layia; ddw – Doyen’s dune weevil; dpcp – Diamond-petaled California poppy; fkr – Fresno kangaroo rat; gkr – Giant kangaroo rat; hws – Hoover’s woolly-star; jpg – Jared’s peppergrass; km – Kern mallow; lhsb – Lost Hills saltbush; lss – Lesser saltscale; mm – Merced monardella; mp – Merced phacelia; mtt – Munz’s tidy-tips; ons – Oil neststraw; pbbb – Palmate-bracted bird’s-beak; tp – Tejon poppy; rbr – Riparian brush rabbit; rwr – Riparian woodrat; sjas – San Joaquin antelope squirrel; sjdb – San Joaquin dune beetle; sjkf – San Joaquin kit fox; sjkr – San Joaquin kangaroo rat; sjlt – San Joaquin LeConte’s thrasher; sjwt – San Joaquin woolly-threads; snkr – Short-nosed kangaroo rat; tbw – Temblor buckwheat; tgm – Tulare grasshopper mouse; tkr – Tipton kangaroo rat; vc – Vasek’s clarkia

## 4 Conduct essential research and monitoring.

Table 10 lists essential research and monitoring needs for covered species by geographic area or community. Habitat surveys and population monitoring for covered species are priorities in most geographic areas. Most research on population biology and habitat management for several species can be combined into single programs, reducing costs, increasing coverage and strengthening quality of ecosystem-level management. Large blocks of public land provide the best setting for control and execution of scientifically valid research on featured species biology and habitat management. Seed banking is included in Table 10 with research and monitoring of plant species where known populations of plants occur. Combining all of these tasks by study area reduces overall costs. When seed banking is identified as a recovery action, seed collections must be representative of the source populations and must not deplete them. Detailed guidelines for seed collection have been published by the Center for Plant Conservation (1991). See the recovery strategy section of each species account for further details on species-specific research and monitoring needs.

**Table 10. Demographic and Other Research and Monitoring Needs for Featured Species in Upland and Riparian Communities of the San Joaquin Valley Planning Area.** TBD = to be determined; N/A = not applicable. See Figure 70 for the location of research areas.

Recovery Task #	Study Area (if applicable)	Tasks and Target Species <sup>1</sup>	Comments	Priority
4.1	Santa Barbara Canyon, Santa Barbara Co.	effects of grazing + census + monitoring + reproduction & demography + identity of pollinators + seed banking (all tasks for <b>cjf</b> )		2
4.2	Cuyama Valley, Santa Barbara & San Luis Obispo Counties	census ( <b>snkr</b> ) + monitoring ( <b>bnll, gkr, sjas, sjlt</b> )		3
4.3	Carrizo Plain Natural Area, San Luis Obispo Co.	competition from exotics ( <b>cjf, sjwt</b> ) + census ( <b>cjf, jpg, mtt, lhsb</b> ) + monitoring ( <b>cjf, sjwt, hws, jpg, mtt, lhsb, tbw</b> ) + reproduction & demography ( <b>cjf, sjwt</b> ) + identity of pollinators ( <b>cjf</b> ) + seed banking ( <b>cjf</b> ) + pesticide effects on pollinators ( <b>cjf</b> )	<b>cjf, sjwt</b> censuses & reproduction & demography partly completed; fire effects on <b>cjf</b> and grazing effects on <b>sjwt</b> will be studied on same plots as for animals	2
4.4	Carrizo Plain Natural Area, San Luis Obispo Co.	effects of fire ( <b>cjf, bnll, gkr, sjas, snkr, tgm</b> ) + effects of grazing ( <b>sjwt, bnll, gkr, sjas, snkr, sjlt, tgm</b> ) + competition from Heermann's kangaroo rat ( <b>snkr</b> ) + census ( <b>bnll, gkr, snkr</b> ) + monitoring ( <b>bnll, gkr, snkr, sjas, sjlt, tgm</b> ) + reproduction & demography ( <b>bnll, snkr</b> )	<b>bnll, &amp; gkr</b> censuses & reproduction & demography partly completed	2

<b>Recovery Task #</b>	<b>Study Area (if applicable)</b>	<b>Tasks and Target Species <sup>1</sup></b>	<b>Comments</b>	<b>Priority</b>
4.5	Carrizo Plain Natural Area, San Luis Obispo Co.	effects of fire + effects of grazing + census + monitoring + reproduction & demography (all tasks for <b>sjkf</b> )	the wider-ranging kit fox requires different experimental design than for more sedentary animals & plants though some actions in habitat management can be combined for cost savings	2
4.6	Carrizo Plain Natural Area, San Luis Obispo Co.	mating & social systems ( <b>gkr</b> )	some aspects of research completed or in progress	3
4.7	Kern Lake, Kern Co.	competition from exotics + census + reproduction & demography + seed banking (all tasks for <b>bss</b> )		1
4.8	Kern Lake, Kern Co.	census ( <b>bvls</b> ) + monitoring ( <b>bss</b> , <b>bvls</b> ) + reproduction & demography ( <b>bvls</b> )	bss can be monitored at same time as bvls is monitored	1
4.9	Kern Lake, Kern Co.	systematics & genetics ( <b>bss</b> )		2
4.10	Lokern, Kern Co.	competition from exotics ( <b>km</b> ) + census ( <b>km</b> ) + monitoring ( <b>km</b> , <b>hws</b> , <b>lhsb</b> ) + reproduction & demography ( <b>km</b> ) + identity of pollinators ( <b>km</b> )	km reproduction & demography partly completed; grazing & fire effects on km will be studied on same plots as for animals	2
4.11	Lokern, Kern Co.	effects of grazing ( <b>km</b> , <b>gkr</b> , <b>snkr</b> , <b>sjas</b> , <b>sjkf</b> , <b>sjlt</b> , <b>tgm</b> ) + effects of fire ( <b>km</b> , <b>gkr</b> , <b>snkr</b> , <b>sjas</b> , <b>sjkf</b> , <b>sjlt</b> , <b>tgm</b> ) + census ( <b>gkr</b> , <b>sjkf</b> , <b>sjlt</b> ) + monitoring ( <b>gkr</b> , <b>tgm</b> , <b>snkr</b> , <b>sjas</b> , <b>sjkf</b> , <b>sjlt</b> ) + reproduction & demography ( <b>bnll</b> )	gkr census in progress at one site; bnll reproduction & demography could be investigated at Elk Hills-Buena Vista Valley in addition or in place of this site.	2
4.12	Lokern, Kern Co.	pesticide effects on pollinators ( <b>km</b> ), insect prey base ( <b>bnll</b> , <b>tgm</b> , <b>sjlt</b> ), & targeted species ( <b>bnll</b> , <b>tgm</b> , <b>sjlt</b> )		1
4.13	Elk Hills-Buena Vista Valley area, Kern Co.	competition from exotics ( <b>ons</b> ) + census ( <b>ons</b> ) + monitoring ( <b>hws</b> , <b>ons</b> ) + reproduction & demography ( <b>ons</b> ) + characteristics of microhabitat ( <b>ons</b> ) + life history ( <b>ons</b> ) + seed banking ( <b>ons</b> )		1

Recovery Task #	Study Area (if applicable)	Tasks and Target Species <sup>1</sup>	Comments	Priority
4.14	Elk Hills-Buena Vista Valley area, Kern Co.	competition from Heermann's kangaroo rat ( <b>snkr</b> ) + census ( <b>sjlt</b> ) + monitoring ( <b>gkr, snkr, sjas, sjlt, tgm</b> ) + effects of grazing ( <b>bnll, gkr, snkr, sjas, sjlt, tgm</b> )	entire region from Elk Hills-McKittrick Valley southward thorough Maricopa area, but centered on Naval Petroleum Reserves in California	2
4.15	Elk Hills-Buena Vista Valley area, Kern Co.	census + monitoring + reproduction & demography + dispersal + effects of grazing (all tasks for <b>sjkf</b> )	entire region from Elk Hills-McKittrick Valley southward thorough Maricopa area, but centered on Naval Petroleum Reserves in California; the wider-ranging kit fox requires different experimental design though some actions in habitat management can be combined for cost savings	2
4.16	Lost Hills, Kern Co.	monitoring ( <b>hws, sjwt, lhsb</b> ) + reproduction & demography ( <b>sjwt</b> )		2
4.17	Kern Bluffs + Kern Canyon + metro Bakersfield + Granite Station, Kern Co.	effects of grazing + effects of off-road vehicle control ( <b>bc, snkr, sjkf</b> ) (Kern Bluffs) + census + monitoring + reproduction & demography + identity of pollinators (all tasks for <b>bc</b> )		2
4.18	Sand Ridge ( <b>bc</b> ) + Bena- Caliente ( <b>bc, vc</b> ), Kern Co	competition from exotics + effects of off-road vehicle control ( <b>bc, snkr, sjkf</b> ) (Sand Ridge, <b>bc</b> ; Bena Hills, <b>vc</b> ) + effects of fire (Sand Ridge, <b>bc</b> ) + census ( <b>bc, vc</b> ) + monitoring ( <b>bc, vc, snkr, sjas, sjkf</b> ) + reproduction & demography ( <b>bc, vc</b> ) + identity of pollinators ( <b>bc</b> ) + seed banking ( <b>vc</b> )		1
4.19	Sand Ridge or Wheeler Ridge	pesticide effects on pollinators ( <b>bc</b> )		2
4.20	Wheeler Ridge + Comanche Point + Cottonwood Creek + Fuller Acres, Kern Co.	effects of grazing (Wheeler Ridge) + census + monitoring (Cottonwood Cr., Fuller Acres) + reproduction & demography + identity of pollinators (all tasks for <b>bc</b> )	monitoring for <b>bc</b> at Wheeler Ridge & Comanche Point can be combined with animal monitoring for cost savings (see next task)	2
4.21	Wheeler Ridge + Comanche Point, Kern Co.	monitoring ( <b>bc, bnll, snkr, sjkf</b> )		3
4.22	All inhabited sites, Kern Co.	systematics & genetics ( <b>bc</b> )		3

Recovery Task #	Study Area (if applicable)	Tasks and Target Species <sup>1</sup>	Comments	Priority
4.23	Alameda, Kern, Kings, Monterey, Santa Barbara, San Luis Obispo, Tulare, & Ventura Counties	systematics & genetics ( <b>km</b> )	includes geographic range of Parry's mallow	2
4.24	Pixley National Wildlife Refuge-Allensworth Ecological Reserve, Tulare Co.	competition from Heerman's kangaroo rat ( <b>tkr</b> ) + effects of grazing ( <b>bnll, tkr</b> ) + effects of fire ( <b>bnll, tkr</b> ) + census ( <b>bnll, tkr, sjkf</b> ) + monitoring ( <b>bnll, tkr, sjkf</b> ) + reproduction & demography ( <b>bnll, tkr</b> )	census for bnll, tkr partly completed; some aspects of grazing and fire management for tkr in progress; some aspects of reproduction and demography for bnll, tkr completed or in progress	2
4.25	Pixley National Wildlife Refuge-Allensworth Ecological Reserve, Kern National Wildlife Refuge-Semitropic Ridge Natural Area, Kern & Tulare Counties	dispersal + movements + diet + reproduction & demography + use of agricultural fields + use of artificial dens (all tasks for <b>sjkf</b> )	habitat management studies for bnll, tkr (see preceding task) will provide some information for habitat management for sjkf	2
4.26	Kettleman Hills, Kings Co.	monitoring + census + reproduction & demography + life history + land use effects (all tasks for <b>ddw</b> )		1
4.27	Kettleman Hills-Devils Den, Fresno, Kings, & Kern Counties	competition from exotics ( <b>sjwt</b> ) + census ( <b>jpg</b> ) + monitoring ( <b>hws, jpg, sjwt</b> ) + reproduction & demography ( <b>sjwt</b> )		2
4.28	Kettleman Hills, Kings & Fresno Counties	monitoring ( <b>bnll, gkr, snkr, sjas, sjkf, sjlt</b> )	habitat management studies (grazing, fire) & population monitoring are in progress	3
4.29	Lemoore Naval Air Station, Kings Co.	effects of grazing + effects of fire + census + monitoring (all tasks for <b>fkr</b> )		1
4.30	Kreyenhagen Hills, Fresno Co.	effects of grazing ( <b>cjf</b> ) + competition from exotics ( <b>cjf</b> ) + census ( <b>cjf</b> ) + monitoring ( <b>cjf, tgm, snkr, sjlt, sjkf</b> ) + reproduction & demography ( <b>cjf</b> ) + identity of pollinators ( <b>cjf</b> ) + seed banking ( <b>cjf</b> )	priority is for cjf tasks; monitoring for other species can be accomplished during trips to study cjf	2

Recovery Task #	Study Area (if applicable)	Tasks and Target Species <sup>1</sup>	Comments	Priority
4.31	Jacalitos Hills, Fresno Co.	monitoring + reproduction & demography (all tasks for <b>sjwt</b> )		2
4.32	Alkali Sink Ecological Reserve, Fresno Co.	census ( <b>pbbb</b> ) + monitoring ( <b>pbbb</b> , <b>hws</b> , <b>bnll</b> , <b>sjkf</b> , <b>possibly fkr</b> ) + reproduction & demography ( <b>pbbb</b> ) + seed banking ( <b>pbbb</b> )	monitoring is priority 1 if fkr is rediscovered or reestablished there	2
4.33	Alkali Sink Ecological Reserve & Kerman Ecological Reserve, Fresno Co.	census (Kerman Ecological Reserve; <b>lss</b> , <b>lhsb</b> ) + monitoring (Kerman Ecological Reserve; <b>lss</b> , <b>lhsb</b> , <b>bnll</b> , <b>possibly fkr</b> ) + competition from Heermann's kangaroo rat ( <b>fkf</b> )		1
4.34	W. Madera Co.	census ( <b>pbbb</b> , <b>lss</b> ) + monitoring ( <b>pbbb</b> , <b>lss</b> , <b>bnll</b> , <b>sjkf</b> , <b>possibly fkr</b> ) + reproduction & demography ( <b>pbbb</b> , <b>bnll</b> ) + seed banking ( <b>pbbb</b> )	pbbb blooms and sets seeds in summer-early fall, so life cycle overlaps much of period for studying bnll	2
4.35	W. Madera Co. + Woodland, Yolo Co.	genetics ( <b>pbbb</b> )		2
4.36	Ciervo-Panoche Natural Area, Fresno & San Benito Counties	land use effects ( <b>casb</b> , <b>snkr</b> ) + census ( <b>jpg</b> , <b>snkr</b> ) + monitoring ( <b>sjwt</b> , <b>jpg</b> , <b>casb</b> , <b>sjdb</b> ) + reproduction & demography ( <b>sjwt</b> , <b>casb</b> , <b>sjdb</b> ) + life history ( <b>casb</b> , <b>sjdb</b> )	gkr census completed	2
4.37	Ciervo-Panoche Natural Area, Fresno & San Benito Counties	census ( <b>sjkf</b> ) + monitoring ( <b>bnll</b> , <b>gkr</b> , <b>snkr</b> , <b>sjas</b> , <b>sjkf</b> , <b>tgm</b> )	sjkf census partly completed (northern portion of area)	2
4.38	all sites, Fresno, Kern, Kings, Merced, & San Luis Obispo Counties	systematics ( <b>lhsb</b> )	study directed at relationship of Carrizo Plain Natural Area population	3
4.39	all sites, Merced Co.	systematics ( <b>mp</b> )		3
4.40	all sites, Kern, Monterey, & San Luis Obispo Counties	systematics ( <b>tbw</b> )		3
4.41	San Luis Island, Merced Co.	census + monitoring ( <b>lhsb</b> )		2
4.42	riparian communities, San Joaquin & Stanislaus Counties	population census ( <b>rbr</b> , <b>rwr</b> ) + monitoring ( <b>rbr</b> , <b>rwr</b> )		2



Recovery Task #	Study Area (if applicable)	Tasks and Target Species <sup>1</sup>	Comments	Priority
4.43	Northwest portion of range, Valley fringes on eastern & northwestern sides (Contra Costa, Alameda, San Joaquin, Stanislaus, Merced, Fresno, Kings, Kern, & Tulare Counties)	census + monitoring ( <b>sjkf</b> )		2
4.44	Camp Roberts, Monterey & San Luis Obispo Counties	land use effects + dispersal + census + monitoring ( <b>sjkf</b> )	some aspects of land use effects & monitoring are in progress	3
4.45	Ft. Hunter-Liggett, Monterey Co.	land use effects + dispersal + census + monitoring ( <b>sjkf</b> )	some aspects of land use effects & monitoring are in progress	3
4.46	Springtown, Alameda Co.	effects of grazing + monitoring + reproduction & demography + seed banking (all tasks for <b>pbbb</b> )		2
4.47	Springtown, Alameda Co.	hydrologic study ( <b>pbbb</b> )		1
4.48	Sacramento National Wildlife Refuge complex + Woodland; Colusa, Glenn, & Yolo Counties	competition from exotics (National Wildlife Refuges only) + monitoring + reproduction & demography + <b>seed banking</b> (all tasks for <b>pbbb</b> )		2
4.49	currently verified sites in Butte, Kern, and Merced Counties	census + monitoring ( <b>lss</b> )		2
4.50	all sites	metapopulation genetics ( <b>bnll</b> )		3
4.51	all sites	metapopulation genetics ( <b>sjkf</b> )	some aspects of study completed or in progress	2
4.52	all sites	population genetics ( <b>bvls</b> )	genetics studies must be conducted prior to reintroduction efforts to ensure that animals taken to establish new populations are genetically representative of the parent population without depleting the genetic diversity of the parent population	2

Recovery Task #	Study Area (if applicable)	Tasks and Target Species <sup>1</sup>	Comments	Priority
4.53	all sites	population genetics ( <b>rbr</b> )	genetics studies must be conducted prior to reintroduction efforts to ensure that animals taken to establish new populations are genetically representative of the parent population without depleting the genetic diversity of the parent population	2
4.54	all sites	population genetics ( <b>rwr</b> )	genetics studies must be conducted prior to reintroduction efforts to ensure that animals taken to establish new populations are genetically representative of the parent population without depleting the genetic diversity of the parent population	2
4.55	TBD	effects of pesticide use & drift ( <b>bvls</b> )	potential sites are Kern Lake & Kern National Wildlife Refuge	2
4.56	TBD	kit fox-red fox-coyote interactions	depends on survey results	2
4.57	TBD	direct & indirect effects of rodenticide use ( <b>sjkf</b> )	potential sites are the Pixley National Wildlife Refuge-Allensworth Natural Area-Kern National Wildlife Refuge area; & the Lokern-Elk Hills area	3
4.58	TBD	census + monitoring + seed banking ( <b>bss</b> )	depends on survey results	1
4.59	TBD	census + monitoring ( <b>cpl</b> )	depends on survey results	2
4.60	TBD	census + monitoring + seed banking ( <b>dpcp</b> )	depends on survey results	1
4.61	TBD	census + monitoring + seed banking ( <b>lss</b> )	depends on survey results	1
4.62	TBD	census + monitoring + seed banking ( <b>mm</b> )	depends on survey results	1
4.63	TBD	census + monitoring ( <b>mp</b> )	depends on survey results	2

<b>Recovery Task #</b>	<b>Study Area (if applicable)</b>	<b>Tasks and Target Species <sup>1</sup></b>	<b>Comments</b>	<b>Priority</b>
4.64	TBD	census + monitoring ( <b>mtt</b> )	depends on survey results	2
4.65	TBD	census + monitoring ( <b>tp</b> )	depends on survey results	2
4.66	TBD	census + monitoring + seed banking ( <b>vc</b> )	depends on survey results	1
4.67	N/A	salinity effects on plant structure ( <b>bss</b> )	laboratory study	3
4.68	N/A	effects of beet leafhopper control ( <b>casb, ddw, sjdb</b> )	laboratory study	2
4.69	N/A	publish scientific name & description ( <b>ddw</b> )	establishing scientific validity of species status & formal naming are important in setting priorities for recovery funding	3
4.70	N/A	matrix projection modeling ( <b>cjf</b> )	modeling should show that all protected populations are self-sustaining	3
4.71	N/A	matrix projection modeling ( <b>pbbb</b> )	modeling should show that all protected populations are self-sustaining	3
4.72	N/A	matrix projection modeling ( <b>km</b> )	modeling should show that all protected populations are self-sustaining	3
4.73	N/A	matrix projection modeling ( <b>sjwt</b> )	modeling should show that all protected populations are self-sustaining	3
4.74	N/A	matrix projection modeling ( <b>bc</b> )	modeling should show that all protected populations are self-sustaining	3
4.75	N/A	single-metapopulation viability analysis ( <b>gkr</b> )	Model should show no greater than a 5 percent probability of extinction over a 200-year period in each of the 3 largest metapopulations; preliminary modeling in progress	3

Recovery Task #	Study Area (if applicable)	Tasks and Target Species <sup>1</sup>	Comments	Priority
4.76	N/A	single-metapopulation viability analysis ( <b>fkr</b> )	Model should show no greater than a 5 percent probability of extinction over a 200-year period for the entire population; preliminary modeling in progress	3
4.77	N/A	single-metapopulation viability analysis ( <b>tkr</b> )	Model should show no greater than a 5 percent probability of extinction over a 200-year period for the entire population; preliminary modeling in progress	3
4.78	N/A	single-metapopulation viability analysis ( <b>bnll</b> )	Model should show no greater than 5 percent probability of extinction over a 200-year period for 5 or more of 7 populations; preliminary modeling in progress	3
4.79	N/A	refine spatially-explicit metapopulation viability analysis ( <b>sjkf</b> )	Model should show no greater than 5 percent probability of extinction for entire subspecies population in 300 years; preliminary modeling in progress	3
4.80	Lawrence Livermore Laboratory, Site 300	census + monitoring + seed banking ( <b>dpcp</b> )		1

<sup>1</sup> Species

bc – Bakersfield cactus; bnll – Blunt-nosed leopard lizard; bss – Bakersfield smallscale; bvls – Buena Vista Lake shrew; casb – Ciervo aegialian scarab beetle; cjl – California jewelflower; cpl – Comanche Point layia; ddw – Doyen’s dune weevil; dpcp – Diamond-petaled California poppy; fkr – Fresno kangaroo rat; gkr – Giant kangaroo rat; hws – Hoover’s woolly-star; jpg – Jared’s peppergrass; km – Kern mallow; lhsb – Lost Hills saltbush; lss – Lesser saltscale; mm – Merced monardella; mp – Merced phacelia; mtt – Munz’s tidy-tips; ons – Oil neststraw; pbbb – Palmate-bracted bird’s-beak; tp – Tejon poppy; rbr – Riparian brush rabbit; rwr – Riparian woodrat; sjas – San Joaquin antelope squirrel; sjdb – San Joaquin dune beetle; sjkf – San Joaquin kit fox; sjkr – San Joaquin kangaroo rat; sjlt – San Joaquin LeConte’s thrasher; sjwt – San Joaquin woolly-threads; snkr – Short-nosed kangaroo rat; tbw – Temblor buckwheat; tgm – Tulare grasshopper mouse; tkr – Tipton kangaroo rat; vc – Vasek’s clarkia

- 5 Maintain and establish linkages in existing natural lands and between islands of habitat of the Valley floor and natural lands around the fringe of the Valley.

To prevent genetic isolation of populations of listed and sensitive species on the Valley floor from populations in the surrounding foothills, or the isolation of kit fox populations in any part of their range, linkages should be maintained and/or established through management or conservation agreements, incentive programs, zoning, acquisition, easements, or other mechanisms.

- 5.1 Establish linkages between isolated islands of habitat on the Valley floor and natural lands in the surrounding foothills.

Table 11 describes linkage areas on the Valley floor and Figure 72 shows their location. For linkages of natural habitat, such as the Chowchilla Canal and Kern River, the primary goal is to enhance natural habitat without compromising the primary function of these waterways. To establish linkages in farmlands, two programs are recommended: 1) focused retirement of drainage problem farmlands and subsequent restoration of natural habitat, (see Task 1.2.6); and 2) focused implementation of a voluntary “safe harbor” program that would establish wildlife friendly habitat areas on active farmlands (see Task 1.2.5). The resulting linkages would be a mosaic of existing natural lands, retired and restored farmland, and active farmlands with associated wildlife habitat areas.

**Table 11. Valley Floor Linkage Areas.** See Figure 72 for the location of each linkage area.

Recovery Task #	Locality	County	Species (target in bold) <sup>1</sup>	Landowner/Comments	Priority
5.1.1	Western Fresno County (Valley floor west of Fresno slough and San Joaquin River)	Fresno	<b>sjkf</b> , snkr, bnll, hws, lhsb, lss, pbbb, <b>gkr</b>	Private farmland/ located between natural lands of western Fresno County, in the Monocline Ridge-Tumey Hills-Panoche Hills area and Mendota Wildlife Management Area and western Madera County, retire strategic parcels to provide continuous link of natural lands; one target area for retirement and safe harbor program is along Panoche Creek	2
5.1.2	Garces Highway	Tulare	<b>bnll</b> , <b>tkr</b> , <b>sjkf</b> , sjas, tgm	Private farmland/ located between Kern National Wildlife Refuge-Semitropic Ridge Natural Area and Pixley-Allensworth Natural Area	2
5.1.3	Highway 43	Tulare	<b>bnll</b> , <b>tkr</b> , <b>sjkf</b>	Private farmland/ located between Creighton Ranch and Pixley-Allensworth Natural Area	3
5.1.4	Semitropic Ridge to Lost Hills	Kern	<b>sjkf</b>	Private farmland/ links to Garces Highway corridor	3
5.1.5	Kettleman Hills to Anticline Ridge	Fresno, Kings, Kern	<b>bnll</b> , <b>sjkf</b> , <b>snkr</b> , tgm, sjlt	Private farmland/ links with Coalinga and Gujarral Hills and rest of natural lands on the west edge of the Valley.	2

Recovery Task #	Locality	County	Species (target in bold) <sup>1</sup>	Landowner/Comments	Priority
5.1.6	Kern River Alluvial Fan Area	Kern	<b>sjkf</b> , <b>tkr</b>	City of Bakersfield, Private/ develop and implement management plan to protect and enhance natural values while maintaining flood-protection features, connecting corridor for sjkf movements across the southern Valley.	3
5.1.7	Chowchilla Canal	Fresno	pbbb, <b>bnll</b> , fk, <b>sjkf</b>	COE/ enhance habitat values without compromising primary function, links Wildlife Management Areas, National Wildlife Refuges, and grasslands areas.	2
5.1.8	Sandy Mush Road	Merced	<b>lhsb</b> , <b>bnll</b> , <b>sjkf</b> , lss, pbbb, fkr	Private/links Merced County National Wildlife Refuges and State areas with the northeastern and northwestern edges of the Valley and with natural areas further south in Madera and Fresno Counties.	2
5.1.9	Poso Creek	Kern	<b>sjkf</b>	Kern County, Private/ links natural lands in the Sierra foothills on the east and Kern National Wildlife Refuge on the west.	3

<sup>1</sup> Species

bc – Bakersfield cactus; bnll – Blunt-nosed leopard lizard; bss – Bakersfield smallscale; bvls – Buena Vista Lake shrew; casb – Ciervo aegialian scarab beetle; cjb – California jewelflower; cpl – Comanche Point layia; ddw – Doyen’s dune weevil; dpcp – Diamond-petaled California poppy; fkr – Fresno kangaroo rat; gkr – Giant kangaroo rat; hws – Hoover’s woolly-star; jpg – Jared’s peppergrass; km – Kern mallow; lhsb – Lost Hills saltbush; lss – Lesser saltscale; mm – Merced monardella; mp – Merced phacelia; mtt – Munz’s tidy-tips; ons – Oil neststraw; pbbb – Palmate-bracted bird’s-beak; tp – Tejon poppy; rbr – Riparian brush rabbit; rwr – Riparian woodrat; sjas – San Joaquin antelope squirrel; sjdb – San Joaquin dune beetle; sjkf – San Joaquin kit fox; sjkr – San Joaquin kangaroo rat; sjlt – San Joaquin LeConte’s thrasher; sjwt – San Joaquin woolly-threads; snkr – Short-nosed kangaroo rat; tbw – Temblor buckwheat; tgm – Tulare grasshopper mouse; tkr – Tipton kangaroo rat; vc – Vasek’s clarkia

Figure 72 (front)

Back side of Figure 72



- 5.2 Reintroduce featured species to enhanced and restored habitat within linkages where necessary (Priority 3).

Once habitat restoration and enhancement has been accomplished in protected areas, appropriate featured plant and animal species should be reestablished if there are no adjacent source populations. Species such as Hoover's woolly-star, San Joaquin kit fox, kangaroo rats, and blunt-nosed leopard lizards have good potential for reestablishment on restored farmlands.

- 5.3 Maintain linkages of natural lands around the fringe of the Valley and elsewhere for San Joaquin kit fox and other listed and sensitive species.

Table 12 describes linkage areas on the fringe of the San Joaquin Valley and in adjacent valleys to the west. Figure 73 depicts linkage areas in the foothills surrounding the San Joaquin Valley. Maintenance of these linkages could be achieved through zoning, safe harbor programs (Task 1.2.5), easements, or other mechanisms.

**Table 12. Linkage Areas Around the San Joaquin Valley Edge and Elsewhere.** See Figure 73 for the location of linkage areas around the San Joaquin valley.

Recovery Task #	Locality	County	Species <sup>1</sup> (target in bold)	Landowner/Comments	Priority
5.3.1	Northeast Valley edge to Madera-Fresno County line	San Joaquin, Stanislaus, Merced, Madera	<b>sjkf, mp, mm</b>	Mostly private/ grassland and oak savanna communities, preserve 90 percent of existing natural lands, maintain grazing and other compatible land uses	3
5.3.2	Northwest Valley edge to Santa Nella	San Joaquin, Stanislaus, Merced	<b>sjkf</b>	Mostly private/ grassland and oak savanna communities, maintain grazing and other compatible land uses	2
5.3.3	East and Southeast Valley edge, Fresno-Tulare County boundary south to Kern River, Kern County	Tulare, Kern	<b>sjkf, bnll, sjas, snkr, tgm, cjf, bc, tp, ons</b>	Mostly private/ grassland and oak savanna communities, maintain grazing and other compatible land uses	2
5.3.4	Western Valley edge, Santa Nella to Panoche Creek	Merced, Fresno	<b>sjkf, jpg, lhsb, mtt, sjas, snkr</b>	Mostly private/ grassland and shrubland communities, maintain grazing and other compatible land uses	2
5.3.5	Western Valley edge, Panoche Creek to Ciervo Wash	Fresno	<b>sjkf, jpg, hws, sjwt, bnll, gkr, sjas, snkr, tgm, sjlt</b>	Mostly private/ grassland and shrubland communities, maintain grazing and other compatible land uses	2
5.3.6	Western Valley edge, Ciervo Wash to Coalinga	Fresno	<b>sjkf, jpg, hws, sjwt, bnll, gkr, sjas, snkr, tgm, sjlt</b>	Mostly private/ grassland and shrubland communities, maintain grazing and other compatible land uses	2

Recovery Task #	Locality	County	Species <sup>1</sup> (target in bold)	Landowner/Comments	Priority
5.3.7	Western Valley edge, Coalinga to McKittrick	Fresno, Kings, Kern	<b>sjkf, cjf, jpg, hws, lhsb, ons, sjwt, bnll, gkr, sjas, snkr, tgm, sjlt</b>	Mostly private/ grassland and shrubland communities, maintain grazing and other compatible land uses	2
5.3.8	Southwest, Southern, and Southeastern Valley edge, McKittrick south to Maricopa, east and north to Kern River	Kern	<b>sjkf, bc, cpl, hws, ons, tp, vc, sjwt, bnll, gkr, sjas, snkr, tgm, sjlt, cjf, lhsb, km</b>	Mostly private/ grassland and shrubland communities, maintain grazing and other compatible land uses	2
5.3.9	Salinas/Pajaro River watershed to San Joaquin Valley	Monterey, San Benito, San Luis Obispo	<b>sjkf</b>	Private, public/ grassland and shrubland communities, preserve and enhance habitat and linkage to the San Joaquin Valley via the Estrella River and San Juan Creek watersheds, to the Carrizo Plain Natural Area, San Joaquin Valley and Kettleman Hills area, maintain grazing and other compatible land uses	2
5.3.10	Cuyama Valley to Carrizo Plain Natural Area through lower portions of Caliente Mountains	San Luis Obispo	<b>hws, bnll, gkr, sjas, snkr, sjkf</b>	Private, public/ grassland and shrubland communities, maintain grazing and other compatible land uses	3
5.3.11	Estrella River watershed	San Luis Obispo, Monterey	<b>dpcp, tbw, sjkf</b>	Private/ maintain grazing and other compatible land uses	3
5.3.12	San Juan Creek watershed	San Luis Obispo	<b>sjkf, bnll, gkr, sjas, snkr, tgm, dpcp, sjwt, tbw</b>	Private/ provides a significant portion of the natural lands linking Salinas Valley and Carrizo Plain Natural Area populations of the sjkf, maintain area in its current mosaic of dryland grain farms and ranch lands, many farmlands in the U.S. Department of Agriculture Conservation Reserve Program	3

<sup>1</sup> Species

bc – Bakersfield cactus; bnll – Blunt-nosed leopard lizard; bss – Bakersfield smallscale; bvls – Buena Vista Lake shrew; casb – Ciervo aegialian scarab beetle; cjf – California jewelflower; cpl – Comanche Point layia; ddw – Doyen’s dune weevil; dpcp – Diamond-petaled California poppy; fkr – Fresno kangaroo rat; gkr – Giant kangaroo rat; hws – Hoover’s woolly-star; jpg – Jared’s peppergrass; km – Kern mallow; lhsb – Lost Hills saltbush; lss – Lesser saltscale; mm – Merced monardella; mp – Merced phacelia; mtt – Munz’s tidy-tips; ons – Oil neststraw; pbbb – Palmate-bracted bird’s-beak; tp – Tejon poppy; rbr – Riparian brush rabbit; rwr – Riparian woodrat; sjas – San Joaquin antelope squirrel; sjdb – San Joaquin dune beetle; sjkf – San Joaquin kit fox; sjkr – San Joaquin kangaroo rat; sjlt – San Joaquin LeConte’s thrasher; sjwt – San Joaquin woolly-threads; snkr – Short-nosed kangaroo rat; tbw – Temblor buckwheat; tgm – Tulare grasshopper mouse; tkr – Tipton kangaroo rat; vc – Vasek’s clarkia

Figure 73

Back of Figure 73

6 Apply adaptive management to protected areas.

All featured species require research on a variety of land management topics to develop the most effective prescriptions for managing protected habitat. Once appropriate research has been conducted, results should be applied to protected areas.

6.1 Revise or develop new management plans for protected habitat (Priority 3).

Based on results of research and monitoring, existing management plans should be revised or new plans developed to maximize the value of protected habitat for featured species.

7 If necessary, reintroduce selected featured species to appropriate habitat within their historic range.

Several featured species may require reintroduction to appropriate habitat within their historic range if surveying efforts do not discover enough extant populations to meet delisting criteria. Specific sites for reintroducing these species are currently unknown.

7.1 Reintroduce Doyen's dune weevil to appropriate habitat (Priority 3).

Sites for reintroduction depend on results of life history studies as well as surveying for extant populations and identifying suitable habitat for reintroduction.

7.2 Propagate and reintroduce Bakersfield smallscale to appropriate habitat (Priority 1).

Continue greenhouse propagation of Bakersfield smallscale to produce a sufficient amount of seed, then reintroduce this species in historic habitat on the Valley floor.

7.3 Reintroduce Comanche Point layia to appropriate habitat (Priority 2).

Using seed collected from populations in the wild or stored in seed banks, reintroduce Comanche Point layia to appropriate habitat on the Valley floor.

7.4 Propagate and reintroduce California jewelflower to appropriate habitat (Priority 2).

Propagate California jewelflower in greenhouses to produce sufficient seed, then reintroduce to appropriate habitat within the historic range, including the Valley floor.

7.5 Reintroduce Vasek's clarkia to appropriate habitat (Priority 2).

Propagate and reintroduce Vasek's clarkia in greenhouses to produce sufficient seed, then reintroduce to appropriate habitat within the historic range.

7.6 Propagate and reintroduce diamond-petaled California poppy to appropriate habitat (Priority 1).

Propagate diamond-petaled California poppy in greenhouses to produce sufficient seed, then reintroduce to appropriate habitat within the historic range.

7.7 Propagate and reintroduce Merced monardella to appropriate habitat (Priority 1).

Propagate Merced monardella in greenhouses to produce sufficient seed, then reintroduce to appropriate habitat within the historic range.

- 8 Periodically review the status of candidates and species of concern to determine if listing as endangered or threatened is necessary.

One of the objectives of this recovery plan is to ensure the long-term conservation of candidates and other species of concern by carrying out tasks specific to the needs of these species. However, if these tasks are not undertaken within a reasonable amount of time, listing of many of these species may be appropriate, thereby providing the protection of formal listing under the Endangered Species Act. Table 13 lists the species requiring this status review and the time frame for conducting this review.

**Table 13. Status Review Requirements for Candidates and Other Species of Concern Featured in this Recovery Plan.**

Recovery Task #	Species	Federal Status	Needed Review	Priority
8.1	Lesser saltscale	species of concern	reevaluate status within 5 years of recovery plan approval or when surveys completed, whichever is less	3
8.2	Bakersfield smallscale	species of concern	reevaluate status within 5 years of recovery plan approval	3
8.3	Lost Hills saltbush	species of concern	reevaluate status within 10 years of recovery plan approval or when surveys completed, whichever is less	3
8.4	Vasek's clarkia	species of concern	reevaluate status within 5 years of recovery plan approval	3
8.5	Temblor buckwheat	species of concern	reevaluate status within 10 years of recovery plan approval or when surveys completed, whichever is less	3
8.6	Tejon poppy	species of concern	reevaluate status within 10 years of recovery plan approval or when surveys completed, whichever is less	3
8.7	Diamond-petaled California poppy	species of concern	reevaluate status within 5 years of recovery plan approval or when surveys completed, whichever is less	3
8.8	Comanche Point layia	species of concern	reevaluate status within 5 years of recovery plan approval or when surveys completed, whichever is less	3
8.9	Munz's tidy-tips	species of concern	reevaluate status within 10 years of recovery plan approval or when surveys completed, whichever is less	3
8.10	Jared's peppergrass	species of concern	reevaluate status within 10 years of recovery plan approval or when surveys completed, whichever is less	3
8.11	Merced monardella	species of concern	reevaluate status within 5 years of recovery plan approval or when surveys completed, whichever is less	3
8.12	Merced phacelia	species of concern	reevaluate status within 10 years of recovery plan approval or when surveys completed, whichever is less	3

Recovery Task #	Species	Federal Status	Needed Review	Priority
8.13	Oil neststraw	species of concern	reevaluate status within 5 years of recovery plan approval	3
8.14	Ciervo aegialian scarab beetle	species of concern	reevaluate status within 5 years of recovery plan approval or when new information is available, whichever is less	3
8.15	San Joaquin dune beetle	species of concern	reevaluate status within 5 years of recovery plan approval or when new information is available, whichever is less	3
8.16	Doyen's dune weevil	species of concern	reevaluate status within 3 years of recovery plan approval	3
8.17	San Joaquin antelope squirrel	species of concern	reevaluate status within 3 years of recovery plan approval	3
8.18	Short-nosed kangaroo rat	species of concern	reevaluate status within 3 years of recovery plan approval	3
8.19	Riparian woodrat	Candidate	reevaluate status within 3 years of recovery plan approval	3
8.20	Tulare grasshopper mouse	species of concern	reevaluate status within 5 years of recovery plan approval	3
8.21	Buena Vista Lake shrew	Candidate	reevaluate status within 3 years of recovery plan approval	3
8.22	Riparian brush rabbit	Candidate	reevaluate status within 3 years of recovery plan approval	3
8.23	San Joaquin LeConte's thrasher	species of concern	reevaluate status within 5 years of recovery plan approval or when new information is available, whichever is less	3

<sup>1</sup> Species

bc – Bakersfield cactus; bnll – Blunt-nosed leopard lizard; bss – Bakersfield smallscale; bvls – Buena Vista Lake shrew; casb – Ciervo aegialian scarab beetle; cjl – California jewelflower; cpl – Comanche Point layia; ddw – Doyen's dune weevil; dpcp – Diamond-petaled California poppy; fkr – Fresno kangaroo rat; gkr – Giant kangaroo rat; hws – Hoover's woolly-star; jpg – Jared's peppergrass; km – Kern mallow; lhsb – Lost Hills saltbush; lss – Lesser saltscale; mm – Merced monardella; mp – Merced phacelia; mtt – Munz's tidy-tips; ons – Oil neststraw; pbbb – Palmate-bracted bird's-beak; tp – Tejon poppy; rbr – Riparian brush rabbit; rwr – Riparian woodrat; sjas – San Joaquin antelope squirrel; sjdb – San Joaquin dune beetle; sjkf – San Joaquin kit fox; sjkr – San Joaquin kangaroo rat; sjlt – San Joaquin LeConte's thrasher; sjwt – San Joaquin woolly-threads; snkr – Short-nosed kangaroo rat; tbw – Temblor buckwheat; tgm – Tulare grasshopper mouse; tkr – Tipton kangaroo rat; vc – Vasek's clarkia

## V. IMPLEMENTATION SCHEDULE

Priorities in the Implementation Schedule are arranged in two tiers. Priority numbers (column 2 of the schedule) are the priorities defined in section III. Priority numbers are organized into tiers or levels of descending priority—that is, within a tier all tasks with the same priority number are of approximately equal priority, but Tier-1 tasks have higher priority than Tier-2 tasks, and so on within that priority rank. Where possible, tasks within a tier are ordered in descending priority, at least in the sense that one or more tasks may have to be started or completed before another task can be accomplished. Yet it should be apparent that no linear hierarchy can suitably express the complex interrelationships between tasks. To accomplish the goal of recovering the ecosystems of which they are parts, and consequently this suite of species, all tasks have to be successfully executed.

Some tasks likely will take considerable time to complete, and some are going to be much more difficult to accomplish because they involve more diverse interest groups. Tasks that are mostly or solely within the jurisdiction of governmental agencies are listed before other, similar tasks involving private entities because the former should be more easily accomplished at lower costs and will put the focus of recovery actions on public lands and agencies. Many of the research tasks are best combined into single research programs for both economy and timeliness, but are listed separately for purposes of costing.

Under the “Task Duration” column, “ongoing” means that the task is currently being implemented and will continue until actions are no longer necessary for recovery; and “continual” means that the task will be implemented on an annual or periodic basis once it is begun.

### Key to Acronyms used in the Implementation Schedule

Definition of task priorities:

Priority 1—An action that must be taken to prevent extinction or prevent the species from declining irreversibly in the foreseeable future.

Priority 2—An action that must be taken to prevent a significant decline in species population or habitat quality, or some other significant negative impact short

of extinction.

Priority 3—All other actions necessary to meet the recovery objectives.

### Definition of task durations:

Continual—A task that will be implemented on a routine basis once begun.

Ongoing—A task that is currently being implemented and will continue until action is no longer necessary.

Unknown—Either task duration or associated costs are not known at this time.

### Responsible parties:

BOR—Bureau of Reclamation  
 Caltrans—California Department of Transportation  
 CANG—California National Guard  
 CDFA—California Department of Food & Agriculture  
 CDFG—California Department of Fish & Game  
 CDPR—California Department of Parks & Recreation  
 CDWR—California Department of Water Resources  
 CEC—California Energy Commission  
 CEPA—California Environmental Protection Agency  
 COE—Army Corp of Engineers  
 CPNA—Carrizo Plain Natural Area  
 DOD—Department of Defense  
 DOE—Department of Energy  
 ER—Ecological Reserve  
 KWA—Kern County Water Agency  
 local—local government  
 NAS—Naval Air Station  
 NPRC—Naval Petroleum Reserves in California  
 NWR—National Wildlife Refuge  
 ROW—Right of way  
 TBD—To Be Determined  
 TNC—The Nature Conservancy  
 USBLM—U.S. Bureau of Land Management  
 USDA—U.S. Department of Agriculture  
 USFS—U.S. Forest Service  
 USFWS—U.S. Fish & Wildlife Service  
 USN—U.S. Navy



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Priority Number	Priority Tier	Task Number	Task Description	Task Duration	Responsible Parties	Cost Estimate (in \$100,000 units)					Comments/Notes
						Total Costs	FY01	FY02	FY03	FY04	
1	1	2.1.1	Protect & secure listed species habitat on NPRCs	ongoing	DOE/USFWS	5	2	1	1	0.5	This task only relates to legal protections of surface & natural communities on NPRCs
1	1	2.1.4	Protect natural lands on Valley floor & piedmont slopes of western Kern Co.	ongoing	CDFG/CDWR/ USFWS/ USBLM	1.75	0.5	0.5	0.5	0.25	This task is for administrative actions only; depends on 1.2.2
1	1	2.2.3	Protect & restore riparian habitat for riparian brush rabbits and woodrats on Stanislaus River, particularly at Caswell State Park	6 years	COE/FWS/ CDFG/CDPR	8	1.5	1.5	1.5	1.5	
1	1	2.2.6	Expand, restore, & protect Fresno kangaroo rat habitat at Lemoore NAS	ongoing	USN/USFWS	10	1.3	3.5	2	2	Includes management research, retirement of agricultural ground, & adaptive management
1	2	2.2.24	Protect habitat for Doyen's dune weevil in Caltrans ROW, conduct survey to determine land ownership	ongoing	Caltrans	0.75	0.25	0.25	0.25		
1	2	2.1.12	Protect, restore & enhance the Carrizo Plain Natural Area	ongoing	USBLM/ CDFG/TNC/ private	30	5	5	5	5	
1	2	2.1.15	Protect & manage natural lands adaptively in the Kreyenhagen Hills	ongoing	USBLM/ private	2	0.5	0.5	0.5	0.2	Depends partly on 1.2.2
1	2	2.1.17	Protect & manage lands appropriately in the Kerman & Alkali Sink ERs	ongoing	CDFG	2.5	0.5	0.5	0.5	0.5	

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						Total Costs	FY01	FY02	FY03	FY04	
1	2	2.2.1	Protect & enhance habitat for palmate-bracted bird's beak on City of Woodland property	ongoing	USFWS/local	TBD					Depends partly on 1.2.2
1	2	2.2.2	Protect, restore, & enhance habitat for palmate-bracted bird's beak at Sprintown Alkali Sink	ongoing	USFWS/CDFG/local/private	TBD					Depends partly on 1.2.2, 4.47
1	2	3.1	Establish a program & protocol for general & directed surveys for featured species	1	USFWS/CDFG/USBLM	1	1				Relates to program establishment and protocol development only
1	2	4.29	Conduct multiple habitat related research tasks at Lemoore NAS for Fresno kangaroo rat	6-10	USN/USFWS/USBLM	8.85	1.35	1.35	1.35	1.6	BLM assistance with prescribed burning
1	2	4.33	Conduct multiple research tasks in the Kerman & Alkali Sink ERs for multiple plant & animal species	ongoing	USFWS/CDFG	1.25	0.25	0.25	0.25	0.25	Monitoring ongoing; research 5 years
1	2	4.47	Research hydrology at Springtown Alkali Sink	3	USFWS/local/private	0.5	0.3	0.1	0.1		
1	2	4.80	Census, monitor, & bank seeds of diamond-petaled California poppy at Lawrence Livermore Lab	ongoing	DOE/USFWS/CDFG	0.3	0.15	0.15			Monitoring ongoing
1	3	2.1.3	Protect, restore, & enhance upland & wetland communities on Kern Fan Element for Buena Vista Lake shrew, Bakersfield smallscale, & other species	5	USFWS/BOR/CDWR/KWA/private	5	1	1	1	1	In conjunction with development of water-banking facilities; depends partly on 1.2.2
1	3	2.1.5	Protect natural lands in western madera Co.	TBD	USFWS/BOR/CDFG/private	350	TBD	TBD	TBD	TBD	Privately owned grazing land; depends partly on 1.2.2
1	3	3.2.1	Conduct surveys for target plant species in the Comanche-Tejon Hills	3	USFWS/CDFG	0.45	0.15	0.15	0.15		

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						Total Costs	FY01	FY02	FY03	FY04	
1	3	3.2.2	Conduct surveys for target plant species in the Caliente-Bena Hills	3	USFWS/ CDFG/ USBLM	0.45	0.15	0.15	0.15		
1	3	3.2.4	Conduct surveys for target plant species in southern Valley alkali sinks in summer-fall	3	USFWS/ CDFG/ USBLM	0.45	0.15	0.15	0.15		
1	3	3.2.5	Conduct surveys for target plant species in Valley alkali sinks north of Kern Co. in summer-fall	3	USFWS	0.5	0.2	0.2	0.1		
1	3	3.2.7	Conduct surveys for target plant species on the NPRC-1	3	USFWS/DOE	0.45	0.15	0.15	0.15		
1	3	3.2.8	Conduct surveys for target plant species on the west side of the southern Valley	3	USFWS/ USBLM/ CDFG	0.6	0.2	0.2	0.2		
1	3	3.2.12	Conduct surveys in historic locations for the diamond-petaled California poppy	3	USFWS/ USBLM/ CDFG	0.6	0.2	0.2	0.2		
1	3	3.2.15	Conduct surveys for Merced monardella in suitable habitat within historic range	3	USFWS/COE/ CDFG	0.45	0.15	0.15	0.15		
1	3	3.2.26	Conduct surveys for riparian species in San Joaquin & Stanislaus counties	3	FWS/COE/ CDFG	0.6	0.2	0.2	0.2		
1	3	3.2.30	Conduct surveys for Buena Vista Lake shrew in southern Valley wetlands (includes target plant species)	3	USFWS/ CDFG/BOR/ CDWR/ USBLM	0.6	0.2	0.2	0.2		
1	3	4.18	Conduct multiple research & monitoring tasks for multiple species in the Sand Ridge & Bena-Caliente area	ongoing	USFWS/ CDFG/COE/ TNC	5	1	1	1	1	Monitoring ongoing; research 5 years

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						Total Costs	FY01	FY02	FY03	FY04	
1	3	4.26	Conduct multiple research tasks for Doyen's dune weevil in the Kettleman Hills	5	USFWS/ Caltrans/ USBLM	1	0.1	0.2	0.3	0.3	
1	3	7.6	Propagate diamond-petaled California poppy in greenhouses & reintroduce to appropriate habitat as necessary	TBD	USFWS/ CDFG	0.8	0.3	0.3	0.2		Depends on finding seed sources
1	3	7.7	Propagate Merced monardella in greenhouses & reintroduce to appropriate habitat as necessary	TBD	USFWS/ CDFG	0.5					Depends on finding extant population
1	4	2.2.4	Protect, restore, & enhance habitats for riparian brush rabbit & riparian woodrat on San Joaquin River NWR	10	USFWS/COE/ local	8	2.5	1	1	1	
1	4	2.2.5	Protect, restore & manage riparian & upland habitat in the San Joaquin River in Merced Co.	15	USFWS/COE/ BOR/CDFG/ CDPR/local	10	0.5	2	2	1	
1	4	2.2.7	Protect natural land north of the Tulare Lake Bed for Fresno kangaroo rats & other species in Kings Co.	TBD	USFWS/ CDFG/ local/private	TBD					Private grazing land
1	4	2.2.14	Develop specialty reserve for Bakersfield cactus in Kern Bluffs area	TBD	USFWS/ CDFG/ local/private	TBD					Depends partly on 1.2.2
1	4	2.2.21	Protect & restore natural communities at Kern Lake for Buena Vista Lake shrew & Bakersfield smallscale	5	USFWS/BOR/ CDWR/ private	5	2	1	1	0.5	Depends on 1.2.2
1	4	2.2.23	Protect natural communities for California jewelflower & other featured species at Santa Barbara Canyon	TBD	USFS/FWS/ CDFG/BLM/ private	TBD					Depends partly on 1.2.2

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						Total Costs	FY01	FY02	FY03	FY04	
1	4	2.2.25	Develop & implement management plans for palmated bird's-beak at Colusa, Delevan, & Sacramento NWRs	ongoing	FWS	5.8	2.2	0.9	0.9	0.9	Research 5 years; monitoring ongoing
1	4	2.2.26	Develop & implement management plan for diamond-petaled California poppy at Lawrence Livermore Lab	ongoing	DOE	1.3	0.5	0.2	0.2	0.2	
1	4	4.7	Conduct multiple research tasks on Bakersfield smallscale at Kern Lake	5	USFWS/ CDFG/ CDWR/local/ private	5	1	1	1	1	
1	4	4.8	Conduct multiple research tasks & monitoring for the Buena Vista Lake shrew at Kern Lake	ongoing	USFWS/BOR/ CDWR	TBD	0.5	0.5	0.5	0.1	
1	4	7.2	Propagate Bakersfield smallscale in greenhouses & reintroduce to appropriate habitat as necessary	TBD	USFWS/ CDFG/ local/private	0.8	0.3	0.3	0.2		Depends on survey results
1	5	2.2.18	Protect natural land in Bena Hills-Caliente Hills & develop speciality reserves for multiple plant species	ongoing	USFWS/ private	TBD					Depends on 1.2.2
1	5	2.2.20	Protect natural land in Comanche-Tejon hills & develop speciality reserves for multiple plant species	ongoing	USFWS/ private	TBD					Depends on 1.2.2
1	5	3.2.18	Conduct surveys for upland vertebrates on the northern Valley floor	3	USFWS/ CDFG	0.8	0.5	0.2	0.1		
1	5	4.12	Conduct pesticide related research for multiple species in the Lokern	5	USFWS/ CDFG/USBL/ CDFA/CEPA	12.5	2.5	2.5	2.5	2.5	

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						Total Costs	FY01	FY02	FY03	FY04	
1	5	4.13	Conduct multiple research tasks & monitoring for oil neststraw & Hoover's woolly-star in the Elk Hills-Buena Vista Valley area	ongoing	USFWS/COE/private	7.455	1.515	1.485	1.485	1.485	Monitoring ongoing; prevent disturbance one time; research 5 years
1	5	4.58	Census, monitor & bank seeds of any new populations of Bakersfield smallscale	TBD	USFWS/CDFG/CDWR/local/private	TBD					
1	5	4.60	Census, monitor & bank seeds of any new populations of diamond-petated California poppy	TBD	USFWS/CDFG	TBD					
1	5	4.61	Census, monitor & bank seeds of any new populations of lesser saltscale	TBD	USFWS/CDFG	TBD					
1	5	4.62	Census, monitor & bank seeds of any new populations of Merced monardella	TBD	USFWS/CDFG	TBD					
1	5	4.66	Census, monitor & bank seeds of any new populations of Vasek's clarkia	TBD	USFWS/CDFG	TBD					
2	1	1.1	Develop regional cooperative program that coordinates land use planning & biodiversity conservation	ongoing	USFWS/CDFG/BOR/USBLM/others	TBD	1	1	1	1	
2	1	1.2.1	Develop & implement an outreach plan	ongoing	USFWS/others	TBD	0.5	0.4	0.3	0.3	
2	1	1.2.2	Develop economic incentives for conserving listed species & natural communities on private lands	TBD	USFWS/CDFG/private	TBD					Depends on legislation
2	1	1.2.6	Coordinate retirement of farmlands with drainage problems with recovery needs of featured species	TBD	BOR/USFWS/CDWR	TBD	1	1	1	1	

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						Total Costs	FY01	FY02	FY03	FY04	
2	1	2.1.6	Protect natural lands in northcentral Fresno Co.	ongoing	USFWS/BOR	TBD					Depends on 1.2.2
2	1	2.1.7	Protect natural land in the Pixley NWR-Allensworth NA area	ongoing	USFWS/ CDFG/ local	TBD					Partly depends on 1.2.2
2	1	2.1.19	Protect & maintain compatible land uses in the northwestern portion of the kit fox range	ongoing	USFWS/ CDFG/ local/private	TBD					Partly depends on 1.2.2
2	1	2.2.8	Develop specialty reserve for Bakersfield cactus in Granite Station area	TBD	USFWS/ private	TBD					Depends on 1.2.2
2	1	2.2.19	Protect natural land & establish specialty reserve for Bakersfield cactus at Sand Ridge	ongoing	USFWS/ CDFG/ COE/TNC/ local	TBD					Depends partly on 1.2.2; protection ongoing
2	1	4.1	Conduct multiple research & monitoring tasks for California jewelflower in Santa Barbara Canyon	ongoing	USFS/ USFWS/ USBLM/ CDFG	1.7	0.975	0.2		0.525	Monitoring ongoing
2	1	4.3	Conduct multiple research & monitoring tasks for multiple plant species on the Carrizo Plain	ongoing	USFWS/ CDFG/ BLM/TNC	TBD	2.75	1.45	1.25	2.45	Monitoring ongoing; research 5-10 years
2	1	4.4	Conduct multiple research & monitoring tasks for multiple animal species on the Carrizo Plain	ongoing	USBLM/ USFWS/ CDFG/TNC	TBD	1.5	1.5	1.5	1.5	Monitoring ongoing; research for 5 years
2	1	4.5	Conduct multiple research & monitoring tasks for the kit fox on the Carrizo Plain	ongoing	USBLM/ USFWS/ CDFG/TNC	9.8	1.75	1.5	1.5	1.7	Monitoring ongoing; research 5-6 years
2	1	4.56	Determine interactions & effects on kit foxes of red foxes, coyotes, & feral dogs	5	USFWS/ CDFG	8.7	1.8	1.6	1.7	1.8	

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						Total Costs	FY01	FY02	FY03	FY04	
2	1	5.3.9	Maintain & enhance habitat for San Joaquin kit fox in Salinas River-Pajaro River watersheds	ongoing	USFWS/CDFG/ USBLM/local/ private	TBD					Depends on 1.2.2
2	2	1.2.3	Encourage & assist local entities in developing & implementing large-area HCPs	ongoing	USFWS/CDFG/ local/private/ USBLM	TBD					Depends partly on 1.2.2
2	2	1.2.4	Encourage & assist in development & implementation of mitigation banks	ongoing	USFWS/CDFG/ local/private/ USBLM	TBD					
2	2	1.2.5	Encourage & assist land owners & private interest groups in developing safe-harbor programs	ongoing	USFWS/CDFG/ local/private	TBD					Depends on 1.2.2
2	2	2.1.2	Protect San Joaquin kit fox habitat on Camp Roberts & Fort Hunter-Liggett	ongoing	DOD/CANG/ USFWS	TBD					
2	2	2.1.14	Protect natural lands in the Ciervo-Panoche Natural Area	ongoing	USBLM/CDFG/ private	18	3	3	3	3	Depends partly on 1.2.2
2	2	3.2.3	Conduct surveys for target plant species at Rancheria Gulch/Adobe Canyon	2	USFWS/CDFG	0.35	0.2	0.15			
2	2	3.2.4	Conduct surveys for target plant species in southern Valley alkali sinks in spring	2	USFWS/CDFG	0.4	0.2	0.2			
2	2	3.2.5	Conduct surveys for target plant species in Valley alkali sinks north of Kern County in spring	2	USFWS/CDFG	0.4	0.2	0.2			
2	2	3.2.6	Conduct surveys for target plant species in alkali sinks in the Sacramento Valley	2	USFWS/CDFG	0.4	0.2	0.2			
2	2	3.2.9	Conduct surveys for California jewelflower at Cottonwood Pass	2	USFWS/CDFG	0.2	0.1	0.1			



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						Total Costs	FY01	FY02	FY03	FY04	
2	2	3.2.10	Conduct surveys for Temblor buckwheat in historic locations outside of Elk Hills	2	USFWS/CDFG/ USBLM	0.45	0.25	0.2			
2	2	3.2.11	Conduct surveys for Tejon poppy in the Salt Creek area	2	USFWS/CDFG/ USBLM	0.2	0.1	0.1			
2	2	3.2.13	Conduct surveys for Munz's tidy-tips in historic locations in San Luis Obispo Co.	2	USFWS/CDFG/ USBLM	0.2	0.1	0.1			
2	2	3.2.14	Conduct surveys for Jared's peppergrass in historic locations	2	USFWS/CDFG/ USBLM	0.4	0.2	0.2			
2	2	3.2.16	Conduct surveys for Merced phacelia in historic locations	2	USFWS/CDFG	0.2	0.1	0.1			
2	2	4.35	Conduct genetics research on palmate-bracted bird's-beak populations in Woodland & W. Madera Co.	2	USFWS/CDFG	0.6	0.4	0.2			
2	2	4.23	Conduct systematics & genetics research on Kern mallow	2	USFWS/CDFG/ USBLM	0.7	0.4	0.3			
2	2	5.1.7	Enhance natural values of Chowchilla Bypass easement properties as a linkage for listed species	ongoing	USFWS/COE/ BOR	TBD	0.2	0.1			Graze outer banks of levees; should generate revenue
2	3	2.2.9	Protect natural land for multiple plant species in the Devil's Den area	ongoing	USFWS/CDFG/ USBLM	TBD					Depends on 1.2.2
2	3	2.2.10	Protect natural land for multiple plant species in the Lost Hills-Buena Vista Slough area	ongoing	USFWS/CDFG/ USBLM	TBD					Depends on 1.2.2
2	3	2.2.11	Protect natural land for Hoover's woolly-star & lesser saltscale in Jerry Slough/Hwy. 58 area	ongoing	USFWS/CDFG	TBD					Depends on 1.2.2

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						Total Costs	FY01	FY02	FY03	FY04	
2	3	2.2.16	Protect natural land & establish speciality reserve for Bakersfield cactus at Mouth of Kern Canyon	ongoing	USFWS/CDFG/ local	TBD	0.25				Depends on 1.2.2; cost for fencing
2	3	2.2.22	Protect natural land & establish speciality reserve for Bakersfield cactus at Mettler-Wheeler Ridge area	ongoing	USFWS/CDFG/ CDWR/local	TBD					Partly depends on 1.2.2
2	3	4.10	Conduct multiple research & monitoring tasks for multiple plant species in the Lokern	ongoing	USFWS/ USBLM/CDFG/ CDWR/CEC/ private	TBD	1.55	1.43	1.43	1.18	Monitoring ongoing; research 5-10 years
2	3	4.11	Conduct multiple research & monitoring tasks for multiple animal & one plant species in the Lokern	ongoing	USFWS/CDFG/ USBLM/CDWR/ CEC/private	9.0	2.5	7.5	1.6	1.7	Research for 5-year minimum; monitoring ongoing
2	3	4.14	Conduct multiple research & monitoring tasks for multiple animal species in the Elk Hills-Buena Vista Valley area	ongoing	USFWS/DOE	7.5	1.5	1.5	1.5	1.5	Research for 5 years minimum; monitoring ongoing
2	3	4.15	Conduct multiple research & monitoring tasks for San Joaquin kit fox in the Elk Hills-Buena Vista Valley area	ongoing	DOE/USFWS	10	2	2	2	2	Monitoring ongoing; research for 5 years
2	3	4.42	Conduct population censusing & monitoring for riparian species in San Joaquin & Stanislaus counties	ongoing	USFWS/CDFG/ DOE	TBD	0.3	0.3	0.3	0.3	Monitoring ongoing; census indefinitely
2	3	4.55	Research the effects of pesticide use & drift on Buena Vista Lake shrews	5	CDFA/CEPA/ USFWS	1.5	0.3	0.3	0.3	0.3	
2	3	5.1.1	Restore habitat & habitat linkages for kit foxes on the Valley floor, western Fresno Co.	TBD	BOR/USFWS/ BLM/private	TBD					Depends partly on 1.2.2

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						Total Costs	FY01	FY02	FY03	FY04	
2	3	5.1.5	Link Kettleman Hills with Gujarral & Coalinga Hills & Anticline Ridge by restoring & protecting habitat for upland species	ongoing	USFWS/ USBLM/ CDFG/ private/local	TBD	1	1	1		Requires protection of about 600 acres; depends partly on 1.2.2
2	3	5.3.8	Protect grass & shrubland communities on southwestern Valley edge from McKittrick to Maricopa & eastward & northward to Kern River, east of Bakersfield	ongoing	USBLM/ USFWS/ CDFG/ CDWR/ others	TBD					Depends on 1.2.2
2	4	3.2.21	Conduct surveys for upland vertebrates in the Kettleman Hills	3	USFWS/ USBLM/ CDFG	0.7	0.3	0.2	0.2		
2	4	3.2.32	Conduct surveys for kit fox in the Salinas River & Pajaro River watersheds	3	USFWS/CDFG	0.9	0.3	0.3	0.3		
2	4	4.9	Conduct systematics & genetics research on Bakersfield smallscale at Kern Lake	2	USFWS/CDFG	0.6	0.4	0.2			
2	4	4.16	Conduct multiple research tasks & monitoring for multiple plant species in the Lost Hills	ongoing	USFWS/ USBLM/ CDFG	2	0.4	0.4	0.4	0.4	Monitoring ongoing; research 5-10 years
2	4	4.19	Conduct research on pesticide effects on pollinators of Bakersfield cactus	3	USFWS/CDEA/ CEPA/USBLM	0.65	0.25	0.25	0.15		
2	4	4.20	Conduct multiple research tasks & monitoring for Bakersfield cactus at Wheeler Ridge & other locations in Kern Co.	ongoing	USFWS/ CDWR/CDFG	TBD	5.425	3.725	3.7	3.7	Monitoring ongoing; research 5-10 years
2	4	4.24	Conduct multiple research tasks & monitoring of multiple animal species at Pixley NWR/Allensworth ER	ongoing	USFWS/CDFG	10	2	2	2	2	Monitoring ongoing; research 6 years

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						Total Costs	FY01	FY02	FY03	FY04	
2	4	4.27	Conduct multiple research tasks & monitoring for multiple plant species at Kettleman Hills & Devil's Den	ongoing	USFWS/CDFG/USBLM	TBD	1.525	1.45	1.45	1.45	Monitoring ongoing; research 5-6 years
2	4	4.30	Conduct multiple research tasks & monitoring for multiple plant & animal species at the Kreyenhagen Hills	ongoing	USFWS/USBLM/private	5	1	1	1	1	Monitoring ongoing; research 5 years
2	4	4.31	Conduct multiple research tasks & monitoring for San Joaquin woolly-threads at Jacalitos Hills	ongoing	USFWS/USBLM/private	TBD	0.225	0.15	0.15	0.15	Monitoring ongoing; research 5-10 years
2	4	4.32	Conduct multiple research tasks & monitoring for palmate-bracted bird's-beak & multiple animal species at Alkali Sink ER	ongoing	USFWS/CDFG	10	2	2	2	2	
2	4	4.34	Conduct multiple research tasks & monitoring for multiple plant & animal species in W Madera Co.	TBD	USFWS/BOR	TBD	0.5	0.5	0.5	0.5	Monitoring ongoing; research 5-10 years
2	4	4.36	Conduct multiple research tasks & monitoring for multiple plant & animal species in the Ciervo-Panoche area	5	USFWS/USBLM/CDFG	1.5	0.3	0.3	0.3	0.3	
2	4	4.37	Conduct censuses for kit fox & monitoring for multiple animal species in the Ciervo-Panoche area	ongoing	USFWS/USBLM/CDFG	TBD	0.3	0.2	0.1	0.1	Monitoring ongoing
2	4	4.41	Census & monitor Lost Hills saltbush population at San Luis Island	ongoing	USFWS	TBD	0.05	0.05	0.05	0.05	Monitoring ongoing
2	4	4.43	Census & monitor kit fox in the NE & NW Valley fringes & in the NW portion of the range	ongoing	USFWS/CDFG	TBD	0.5	0.5	0.5	0.5	Monitoring ongoing

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						Total Costs	FY01	FY02	FY03	FY04	
2	4	4.46	Conduct multiple research tasks for palmate-bracted bird's-beak at Springtown	ongoing	USFWS/CDFG/ local/private	TBD	3.3	1.8	1.8	1.8	Monitoring ongoing; research 5-10 years
2	4	4.48	Conduct multiple research tasks & monitoring for palmate-bracted bird's-beak at Woodland & Sacramento NWR complex	ongoing	USFWS	8.77	1.87	1.72	1.72	1.72	Monitoring ongoing; research 5 years
2	4	4.49	Conduct censuses & monitoring of lesser salt-scale populations in Butte, Merced, & Kern counties	ongoing	USFWS	TBD	0.2	0.15	0.15	0.15	
2	4	4.51	Conduct metapopulation genetics research on the San Joaquin kit fox	2	USFWS/CDFG	0.6	0.4	0.2			
2	4	4.52	Conduct population genetics research on the Buena Vista Lake shrew	2	USFWS/private	0.8	0.4	0.4			
2	4	4.53	Conduct population genetics research on the riparian brush rabbit	2	USFWS/CDFG/ CDPR/COE	0.8	0.4	0.4			
2	4	4.54	Conduct population genetics research on the riparian woodrat	2	USFWS/CDFG/ CDPR/COE	0.8	0.4	0.4			
2	4	4.59	Census & monitor any new populations of Comanche Point layia	TBD	USFWS/CDFG	TBD					
2	4	4.63	Census & monitor any new populations of Merced phacelia	TBD	USFWS/CDFG	TBD					
2	4	4.64	Census & monitor any new populations of Munz's tidy-tips	TBD	USFWS/CDFG	TBD					
2	4	4.65	Census & monitor any new populations of Tejon poppy	TBD	USFWS/CDFG	TBD					

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						Total Costs	FY01	FY02	FY03	FY04	
2	4	5.1.2	Establish linkage along Garce's Hwy Corridor for multiple animal species	TBD	USFWS/CDFG/ local/private	TBD					Depends on 1.2.2 and 1.2.6
2	4	5.1.8	Establish linkage between northwestern & northeastern Valley edges through the Sandy Mush Road area	TBD	USFWS/CDFG/ local/private	TBD					Depends on 1.2.2
3	4	5.3.2	Protect San Joaquin kit fox habitat in northwestern San Joaquin Valley edge	ongoing	USFWS/CDFG/ local/private	TBD					Depends on 1.2.2
3	4	5.3.3	Protect grassland & oak savanna on east & southeastern edge of Valley for several listed species	ongoing	USFWS/CDFG/ local/private	TBD					Depends on 1.2.2
2	4	5.3.5	Protect grass & shrubland communities on western Valley edge, Panoche Creek to Cervo Wash	TBD	USFWS/CDFG/ USBLM	TBD					Depends on 1.2.2
2	4	5.3.6	Protect grass & shrubland communities on western Valley edge, Cervo Wash to Coalinga	TBD	USFWS/CDFG/ USBLM/local	TBD					Depends on 1.2.2
2	4	5.3.7	Protect grass & shrubland communities on western Valley edge, Coalinga to McKittrick	TBD	USFWS/CDFG/ USBLM/local	TBD					Depends on 1.2.2
2	4	5.3.4	Protect grass & shrubland communities on western Valley edge, Santa Nella to Panoche Creek	TBD	USFWS/CDFG/ USBLM	TBD					Depends partly on 1.2.2
2	4	7.3	Reintroduce Comanche Point layia in appropriate habitat as necessary	TBD	USFWS/CDFG	TBD					
2	4	7.4	Propagate California jewelflower in greenhouses & reintroduce to appropriate habitat as necessary	TBD	USFWS/CDFG	TBD	0.30	0.25			Propagation costs

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						Total Costs	FY01	FY02	FY03	FY04	
2	4	7.5	Propagate Vasek's clarkia in greenhouses & reintroduce to appropriate habitat as necessary	TBD	USFWS/CDFG	TBD	0.30	0.25			Propagation costs
2	5	4.17	Conduct multiple research tasks & monitoring on Bakersfield cactus at Kern Bluffs & other locations in Kern Co.	ongoing	USFWS/CDFG/ local/private	TBD	4.8	3.825	3.6	3.6	Monitoring ongoing; research 5-10 years
2	5	4.25	Conduct multiple research task on the kit fox in southern Tulare & northern Kern counties	5	USFWS/CDFG/ BOR	5.2	1	1	1	1.1	
2	5	4.68	Effects of beet leafhopper control on beetle species	3	CDFA/ CEPA	1	0.4	0.3	0.3		
3	1	2.1.13	Protect natural lands & traditional rangeland uses in the Upper Cuyama Valley	ongoing	USFS/USBLM/ USFWS	TBD					Depends on 1.2.2
3	1	2.1.16	Protect & properly manage listed species habitat at Bitter Creek NWR	ongoing	USFWS	TBD					
3	1	2.1.18	Protect & properly manage listed species habitat at Mendota WMA	ongoing	CDFG	TBD					
3	1	4.79	Refine metapopulation viability analysis for the kit fox	3	USFWS/CDFG	0.9	0.3	0.3	0.3		Requires census and demography data not yet available
3	1	5.1.9	Establish & enhance linkage between Kern NWR & Sierran foothills through the Poso Creek area	ongoing	USFWS/COE/ USBLM/local/ private	TBD					
3	1	8.1	Conduct status review of lesser saltlake	1	USFWS	0.1	0.1				Depends on surveys and censuses
3	1	8.2	Conduct status review of Bakersfield smallscale	1	USFWS	0.1	0.1				Depends on surveys and censuses

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						Total Costs	FY01	FY02	FY03	FY04	
3	1	8.4	Conduct status review of Vasek's clarkia	1	USFWS	0.1	0.1				Depends on surveys and censuses
3	1	8.7	Conduct status review of diamond-petaled California poppy	1	USFWS	0.1	0.1				Depends on surveys and censuses
3	1	8.8	Conduct status review of Comanche Point layia	1	USFWS	0.1	0.1				Depends on surveys and censuses
3	1	8.11	Conduct status review of Merced monardella	1	USFWS	0.1	0.1				Depends on surveys and censuses
3	1	8.13	Conduct status review of oil neststraw	1	USFWS	0.1	0.1				Depends on surveys and censuses
3	1	8.16	Conduct status review of Doyen's dune weevil	1	USFWS	0.1	0.1				Depends on surveys and censuses
3	1	8.17	Conduct status review of San Joaquin antelope squirrel	1	USFWS/CDFG	0.1	0.1				Depends on surveys and censuses
3	1	8.18	Conduct status review of short-nosed kangaroo rat	1	USFWS	0.1	0.1				Depends on surveys and censuses
3	1	8.19	Conduct status review of riparian woodrat	1	USFWS	0.1	0.1				Depends on surveys and censuses
3	1	8.21	Conduct status review of Buena Vista Lake shrew	1	USFWS	0.1	0.1				Depends on surveys and censuses
3	1	8.22	Conduct status review of riparian brush rabbit	1	USFWS/CDFG	0.1	0.1				Depends on surveys and censuses
3	2	3.2.17	Conduct surveys for sand dune beetles in sand & sand dune communities of the northwestern Valley	3	USFWS/USBLM	0.75	0.25	0.25	0.25		
3	2	3.2.19	Conduct surveys for upland vertebrates on the southern Valley floor	3	USFWS/CDFG/USBLM	0.9	0.3	0.3	0.3		



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						Total Costs	FY01	FY02	FY03	FY04	
3	2	3.2.20	Conduct surveys for upland vertebrates on the central western Valley edge	3	USFWS/ CDFG/ USBLM	0.6	0.2	0.2	0.2		
3	2	3.2.22	Conduct surveys for upland vertebrates on the southwestern Valley edge	3	USFWS/ CDFG/ USBLM/DOE	0.9	0.3	0.3	0.3		
3	2	3.2.23	Conduct surveys for upland vertebrates on the southeast & southern Valley edge	3	FWS/CDFG/ BLM	0.6	0.2	0.2	0.2		
3	2	3.2.24	Conduct surveys for upland vertebrates in the Cuyama Valley	3	USFS/FWS/ CDFG/BLM	0.6	0.2	0.2	0.2		
3	2	3.2.25	Conduct surveys for upland vertebrates in the San Juan Creek watershed	3	USFWS/USDA/ USBLM	0.9	0.3	0.3	0.3		Includes USDA easement lands
3	2	3.2.27	Conduct surveys for kit fox in the northwestern portion of range & northwestern Valley edge	3	USFWS/CDFG	0.9	0.3	0.3	0.3		
3	2	3.2.28	Conduct surveys for kit fox on the northeastern Valley edge	3	USFWS/BOR/ CDFG	0.9	0.3	0.3	0.3		
3	2	3.2.29	Conduct surveys for kit fox in the Ciervo-Panoche Natural Area	3	USFWS/ USBLM/ CDFG	0.9	0.3	0.3	0.3		Year 1 already accomplished
3	2	3.2.31	Conduct surveys for kit fox on the southeastern Valley edge	3	USFWS/CDFG/ BOR	1.0	0.4	0.3	0.3		
3	2	4.2	Conduct censuses for short-nosed kangaroo rats & monitor populations of multiple animal species in the Cuyama Valley	ongoing	USFWS/ USBLM/ USFS/private	0.3	0.1	0.1	0.1		Census for 3 years; monitoring ongoing
3	2	4.6	Conduct research on mating & social systems of the giant kangaroo rat at the Carrizo Plain	2	USFWS/CDFG/ USBLM	0.6	0.3	0.3			

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						Total Costs	FY01	FY02	FY03	FY04	
3	2	4.21	Monitor populations of multiple plant & animal species at Wheeler Ridge & Comanche Point	ongoing	USFWS/CDFG/CDWR	TBD	0.1	0.1	0.1	0.1	
3	2	4.28	Monitor populations of multiple animal species at the Kettleman Hills	ongoing	USFWS/USBLM/CDFG/CDWR	TBD	0.1	0.1	0.1	0.1	
3	2	4.38	Conduct systematics research on Lost Hills saltbush	2	USFWS/USBLM/CDFG	0.5	0.25	0.25			
3	2	4.39	Conduct systematics research on Merced phacelia	2	USFWS/CDFG/COE	0.5	0.25	0.25			
3	2	4.40	Conduct systematics research on Temblor buckwheat	2	USFWS/USBLM/CDFG	0.5	0.25	0.25			
3	2	4.44	Conduct multiple research tasks & monitoring for the kit fox at Camp Roberts	ongoing	DOD/CANG/USFWS	TBD	1	1	1	1	Monitoring ongoing; research 5-10 years
3	2	4.45	Conduct multiple research tasks & monitoring for the kit fox at Fort Hunter-Liggett	ongoing	DOD/USFWS	TBD	1	1	1	1	Monitoring ongoing; research 5-10 years
3	2	4.50	Conduct metapopulations genetics research on the blunt-nosed leopard lizard	2	USFWS/CDFG	0.8	0.4	0.4			
3	2	4.57	Conduct research on the direct & indirect effects of rodenticides on kit fox	5	CDFA/CEPA/USFWS/CDFG	10	2	2	2	2	
3	2	4.67	Study the effects of salinity on the structure of Bakersfield smallscale	2	USFWS/CDFG	0.4	0.2	0.2			
3	2	4.70	Conduct matrix projection modeling for California jewelflower	1	USFWS	0.15	0.15				

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						Total Costs	FY01	FY02	FY03	FY04	
3	2	4.71	Conduct matrix projection modeling for palmate-bracted bird's-beak	1	USFWS	0.15	0.15				
3	2	4.72	Conduct matrix projection modeling for Kern mallo	1	USFWS	0.15	0.15				
3	2	4.73	Conduct matrix projection modeling for San Joaquin woolly-threads	1	USFWS	0.15	0.15				
3	2	4.74	Conduct matrix projection modeling for Bakersfield cactus	1	USFWS	0.15	0.15				
3	2	4.75	Conduct a single-metapopulation viability analysis on the giant kangaroo rat	1	USFWS/DOE/USBLM/CDFG	0.3	0.3				
3	2	4.76	Conduct a single-metapopulation viability analysis on the Fresno kangaroo rat	1	USFWS/CDFG/USN	0.3	0.3				
3	2	4.77	Conduct a single-metapopulation viability analysis on the Tipton kangaroo rat	1	USFWS/CDFG	0.2	0.2				Assumes analyses of Tipton & Fresno subspecies done together
3	2	4.78	Conduct a single-metapopulation viability analysis on the blunt-nosed leopard lizard	1	USFWS/CDFG	0.3	0.3				
3	2	5.1.6	Enhance & manage Kern River alluvial fan area to ensure use & movement by kit foxes & Tipton kangaroo rats	ongoing	USFWS/CDFG/CDWR/KWA/local	TBD	2.5	2.5	1.0	0.25	
3	2	5.3.10	Maintain & enhance habitat linkages for upland species between CPNA & Cuyama Valley	ongoing	USBLM/USFW-S/CDFG	TBD	0.1	0.1	0.1	0.1	
3	2	5.3.11	Maintain habitat linkage for upland species in the Estrella River watershed	ongoing	USFWS/CDFG/local/private	TBD					Depends partly on 1.2.2

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3	2	5.3.12	Maintain & enhance habitat linkages for upland species in the San Juan Creek watershed, San Luis Obispo Co.	ongoing	USFWS/USDA/CDFG/local/private	TBD					Depends partly on 1.2.2
3	3	2.1.8	Protect federal wildlife refuges & waterfowl easement properties, state wildlife areas & state park land, NW Merced Co.	ongoing	USFWS	TBD					
3	3	2.1.9	Protect & enhance natural lands in Sandy Mush Road & S Grasslands areas, Merced Co.	ongoing	USFWS/CDFG/local/private	TBD					Depends on 1.2.2
3	3	2.1.10	Protect natural land in Kettleman Hills	ongoing	USFWS/USBLM/CDFG/CDPR/BOR	TBD					Depends partly on 1.2.2
3	3	2.1.11	Protect natural land in Kern NWR-Semiotropic Ridge Natural Area	ongoing	USFWS/CDFG/CEC/TNC/private	TBD					Depends partly on 1.2.2 and 1.2.6
3	3	2.2.12	Protect natural land for Bakersfield cactus & other species in Greater Bakersfield, north of Kern River	ongoing	USFWS/CDFG/local/private	TBD					Depends on 1.2.2
3	3	2.2.13	Protect natural land for Bakersfield cactus in Fairfax Road-Hwy 178-Hwy 184 area	ongoing	USFWS/CDFG/local/private	TBD					Depends on 1.2.2
3	3	2.2.15	Protect natural land for Bakersfield cactus in the Fuller Acres area	ongoing	USFWS/CDFG/local/private	TBD					Depends on 1.2.2
3	3	2.2.17	Protect natural land for Bakersfield cactus in the Cottonwood Creek area	ongoing	USFWS/CDFG	TBD					Depends on 1.2.2
3	3	4.69	Publish scientific name & description of Doyen's dune weevil	TBD	private	0.25	0.25				Costs (page) of scientific publication

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						Total Costs	FY01	FY02	FY03	FY04	
3	3	5.1.3	Protect & restore habitat & habitat linkages along Hwy 43 Corridor for Tipton kangaroo rat, bluntnosed leopard lizard, San Joaquin kit fox, & other species	ongoing	USFWS/CDFG/local	TBD					Depends partly on 1.2.2 and 1.2.6
3	3	5.1.4	Protect & restore habitat & habitat linkages for San Joaquin kit foxes between Lost Hills & Semitropic Ridge	ongoing	USFWS/CDFG/local	TBD					Depends partly on 1.2.2 and 1.2.6
3	3	7.1	Reintroduce Doyen's dune weevil to appropriate habitat if necessary	5	USFWS/CDFG/USBLM	TBD	0.3	0.15	0.15	0.15	Monitor reintroduction for at least 5 years
3	4	4.22	Conduct systematics & genetics research at all inhabited sites of Bakersfield cactus	2	USFWS	0.65	0.35	0.3			
3	4	5.2	Reintroduce featured species to restored habitat within linkages	TBD	USFWS/CDFG/USBLM	TBD					
3	4	5.3.1	Protect San Joaquin kit fox habitat in northeastern San Joaquin Valley edge	ongoing	USFWS/CDFG/local/private	TBD					Depends on 1.2.2
3	4	6.1	Revise or develop new management plans for protected areas	TBD	TBD	TBD					
3	4	8.3	Conduct status review of Lost Hills saltbush	1	USFWS	0.1	0.1				Depends on surveys and censuses
3	4	8.5	Conduct status review of Temblor buckwheat	1	USFWS	0.1	0.1				Depends on surveys and censuses
3	4	8.6	Conduct status review of Tejon poppy	1	USFWS	0.1	0.1				Depends on surveys and censuses
3	4	8.9	Conduct status review of Munz's tidy- tips	1	USFWS	0.1	0.1				Depends on surveys and censuses

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3	4	8.10	Conduct status review of Jared's peppergrass	1	USFWS	0.1	0.1				Depends on surveys and censuses
3	4	8.12	Conduct status review of Merced phacelia	1	USFWS	0.1	0.1				Depends on surveys and censuses
3	4	8.14	Conduct status review of Ciervo aegialian scarab beetle	1	USFWS	0.1	0.1				Depends on surveys and censuses
3	4	8.15	Conduct status review of San Joaquin dune beetle	1	USFWS	0.1	0.1				Depends on surveys and censuses
3	4	8.20	Conduct status review of Tulare grasshopper mouse	1	USFWS	0.1	0.1				Depends on surveys and censuses
3	4	8.23	Conduct status review of San Joaquin LeConte's thrasher	1	USFWS	0.1	0.1				Depends on surveys and censuses

